

# Flocking of textiles

> The motif flocking is the high-class alternative to textile printing. One not only flocks sports wear for schools, sport clubs, associations etc., but also fabrics for garments, door mats and a lot more textiles. The motifs may consist of labels, names, numbers, repeated designs or logos. Because of its elegant and relief-like appearance, flock is also used a lot for promotion articles.

**Operating steps:** A screen printing stencil is made from the desired motif. A special flock adhesive is applied through the stencil onto the fabric. Immediately after that flock is applied into the wet adhesive. The fabric is dried at room temperature or in a drier, and finally cleaned by removing surplus flock.



Flocked shirt

## Stencil and screen

For textile flocking, mostly screen fabrics made of polyester are used, as this material possesses a very limited ability to absorb water and stays in form during washing-out and cleaning. Preferred are fabrics from 20T to 29T, i.e. 20 to 29 threads per cm. These are very coarse screens for the normal screen printing, but only with those the required thickness of adhesive can be achieved. The finer the lines or contours of the motif are, the finer should the fabric be chosen. The thickness of the adhesive should be 0.15 to 0.25 mm (wet), i.e. 150 to 250 g/m<sup>2</sup>. Such thickness cannot be achieved with screen fabrics finer than 29T.

The screen printing frame should be made of aluminium (wood doesn't keep its form, steel rusts and stainless steel is very expensive). The size of the frames should be selected such that a sufficient big distance remains between printing motif and the frame sides. When choosing the stencil material it has to be taken into consideration that there are water- and solvent-based flocking adhesives.

## Squeegee and adhesive application

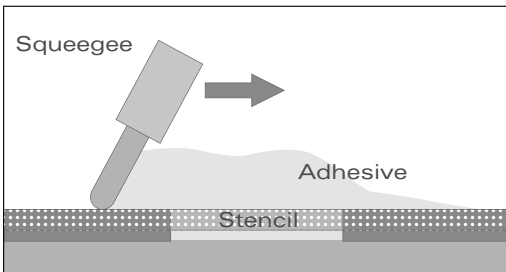
The length of the squeegee has to be selected such that the squeegee is wider than the motif by 50 mm approx. left and right. Squeegees with a thickness of 10 mm and 75 Shore strength have proven best. The squeegee blade has to be ground round, as otherwise a sufficient adhesive coating will not be possible. The number of



Screen

squeegee strokes and the necessary pressure depend on many different influences. It is recommended therefore to make trials prior to the actual production with each new squeegee and each new screen. A basic rule is: Start with two squeegee strokes with strong pressure in order to cover the textile with adhesive, followed by two more squeegee strokes with slight pressure in order to create a high adhesive layer. After the screen has been lifted off the adhesive must form a closed layer on the fabric. Compared to textile printing where the ink has to penetrate deeply into the fabric, when flocking one has to take care that a sufficiently thick layer of adhesive (approx. 0.15 to 0.25 mm, depending on the fibre length) lies on top of the textile, into which the flock fibres can penetrate.

With smaller series (e.g. 10 to 15 pieces per motif) usually the adhesive is applied manually. For larger quantities it is recommended to apply the adhesive automatically. This guarantees an even adhesive application as well as a faster production.



Screen printing of adhesive

## Flocking

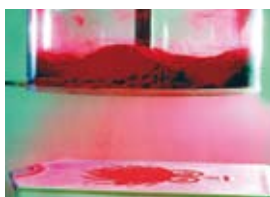
The flocking procedure is carried out with an electrostatic flocking equipment, which charges the flock fibres with a voltage of 50 to 100 kV, enabling the fibres to jump from the equipment to any grounded surface. Prerequisite for a good and washing resistant flocking is therefore that for flocking the textile is placed onto a metal sheet or a metal grid which is connected to the earth wire of the flocking equipment. Very often, the reason for a flocked textile having a poor washing resistance is the bad earthing during the flocking process.

For the flocking process the applicator is moved over the surface to be flocked with a slight shaking movement. With a distance of 10 cm approx. the first fibres are «shot» into the adhesive to act as stabilizer. After a few seconds, the distance of the applicator to the textile is reduced more and more in order to fill the flocked surface as dense as possible. Finally, the applicator is moved as near as possible over the motif without shaking in order to remove surplus flock fibres.

The flock fibres have to have a sufficient electrical conductivity for good flocking. This is achieved by the electrostatic treatment of the flock fibres. Such treatment however, can only work in connection with humidity. It is therefore important that the air humidity during the flocking procedure is according to the instructions of the flock producer. A too dry climate or a dried out flock may be recognized by the fact that it does not jump



Manual flocking



Automatic flocking

as individual fibres from the electrode to the part to be flocked, but forms trees and streaks formed by flock fibres clinging to each other. In this case, the flock fibres do not penetrate into the adhesive with the necessary energy and the flocking will not become abrasion resistant. When the humidity is too high, the flock becomes sticky and tends to form balls and agglomerations. It is strongly recommended to control temperature and humidity during flocking.

### **Drying and curing**

Depending on the type of adhesive used, the flocked textile is placed onto a belt dryer, placed into a rack to dry at room temperature or in a drying oven or with small series just placed on hangers.

Drying and curing are two different procedures which run one after the other. In the first step the water or solvent of the adhesive is evaporated. Only after this is finished, curing can start, i.e. the adhesive can crosslink. This knowledge is very important especially with hot-curing adhesives. During the drying of water based adhesives the adhesive temperature must not rise over 100° C, as in the first step the water evaporates. If the heat is too high, steam bubbles might be generated within the adhesive rendering the flocking unusable. Only after the water has been removed out of the adhesive completely, the curing can be started with the required curing temperature. In order to keep constant



Drier with rack

drying and curing times for hot curing adhesives, it is necessary to operate the drier in the first step with a temperature of max. 100° C and sufficient fresh air input to remove the water. After the evaporation of the water the drier is heated up to curing temperature. During this step only a small amount of fresh air is required, in order to remove humidity and other evaporations.

Please note: The use of a home sauna for drying is not recommended, as high temperatures might be achieved but no air circulates and therefore removing the air humidity is not possible.

### **Cleaning**

After drying the adhesive the surplus flock may be removed by shaking, sucking off, brushing or by a combination of those methods. Special machines are available. With small series or with smooth textiles which do not retain the flock fibres on their surface simple methods of cleaning are quite sufficient.

### **Flock adhesive**

Flock adhesives for textiles are two-component systems, i.e. adhesive and catalyst have to be mixed together prior to application. It is very important that the components are weighed precisely. Moreover, a suitable pigment should be added in order to dye the adhesive in the colour



T-shirt cleaning device

of the flock. With this measure the control of the correct adhesive coating is easier and also slightly bald spots are not so obvious. While a few percent of pigments added are sufficient for a dark flocking onto a light substrate, for white flocking at least 10% of white pigment has to be added. For a light flocking onto a dark textile (e.g. yellow flock on blue fabric) both white pigment as well as pigment in the flock colour have to be added as otherwise an optimum coverage and colour shine can't be achieved.

## **Flock**

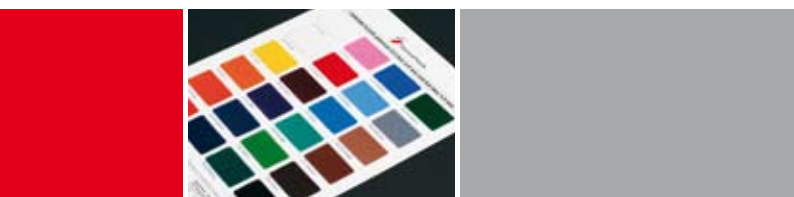
For the textile motif flocking, almost always flock made of polyamide (Nylon) and viscose (Rayon) are used. Both types of flock are offered in light fast, washing resistant and fast to bleeding qualities. The most common sizes are polyamide 3.3 dtex / 0.5 mm, polyamide 6.7 dtex / 1.0 mm, viscose 3.3 dtex / 0.5 mm and viscose 5.6 dtex / 1.0 mm. A very soft touch may be achieved by using 3.3 dtex / 1.0 mm. This size, however, is not as abrasion resistant as the types mentioned above. Moreover, the flocking with this size is not without problems, as the ratio of the fibre length to the fibre thickness is unfavourable and the siftability of the flock is not at its optimum. For door mats, mostly polyamide 22 dtex / 2 mm is used.



Adhesive, catalyst and pigment

Polyamide is sturdier, more elastic and more abrasion resistant than viscose. For soft textiles which are not strained very much, the stability of viscose is sufficient. For textiles with intense usage like floor mats or upholstery polyamide should be used.

Viscose contains more humidity than polyamide. Therefore viscose is more forgiving when the air humidity is too low. Nevertheless even when using viscose the air humidity should be within the recommended limits in order to prevent the flock from drying.



Viscose colour card 1 mm

## Multi colour flocking

For high level flock prints, multi colour flocking is desired.

There are several possibilities:

- a) Flocking and drying of one colour, then flocking of the second colour next to it (only possible with simple motifs, very time consuming).
- b) Flocking of one colour onto the entire motif space, drying, then flocking of the second colour onto the already existing flock layer, etc. (very time consuming, flock onto flock is not very stable and the flocked area is stiff).
- c) Textile printing of several colours and flocking of the last colour only (this can create some very interesting effects).
- d) Multi colour flock transfers (see special description).
- e) MC-technique. Here, the adhesive is printed in form of the entire motif and the flock is applied into the adhesive colour after colour through a screen stencil (fabric 15 S, metallized polyester screen. Very nice motifs are achieved by this method. However, a lot of equipment is necessary as a carousel is recommended to have the individual screens fixed in exactly the same distance of the 1.1 fold flock length suspended freely).



Multi colour motif