

Flocking of sheets and 3D parts

> Flock may be applied onto nearly every substrate. The surface gets a velvety look and touch and offers several technical advantages, depending on the final purpose. For example, flocking is used to insulate against cold and heat, for noise reduction, as sealing, to prevent rattling and grinding noises, as a brush, etc.

Operating steps: First of all, flock adhesive is applied onto the areas to be flocked. The flock is applied into the wet adhesive immediately after that. In most cases this is done with a manual electrostatic flocking device or with an electrostatic flocking machine. In special cases, however, other application methods are used too. The flocked part is dried at room temperature or in a drier and finally cleaned from surplus flock.



Adhesive application

The adhesive application can be compared with a paint job and may be carried out with all those methods which are used for painting, i.e brushing, roller coating, spraying, with a doctor knife. Anyhow, the adhesive has to be prevented from reaching those areas which are not to be flocked. It is recommended to cover those areas with a mask or seal off with masking tape.



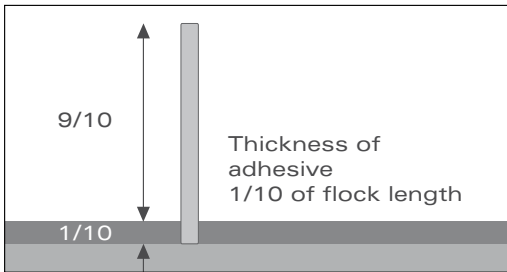
Spraying adhesive



Screen printing adhesive

The substrate has to be prepared in such a way that the adhesive is not absorbed by the surface. Therefore, with porous substrates (wood, chip board, etc.), a basic priming has to be applied prior to the adhesive coating, in order to properly close the pores. Without this procedure the flock adhesive will penetrate into the substrate during the drying process and the flock fibres do not cling properly to the surface, i.e. after the final cleaning bald areas show up.

In order to achieve a sturdy and abrasion resistant flocking, it is necessary that the flock fibers are not only adhered with their cut edges to the adhesive, but that they penetrate into the adhesive layer to approximately one tenth of their length. This means that the thickness of the dried adhesive has to be at least a tenth of the flock length. One has to pay attention to the fact that adhesives may contain solvent or water which are evaporating during the drying procedure. With water-based systems, these are approx. 50 %.



Example for 1 mm flock length and water-based adhesive:

The flock length of 1 mm requires 0.1 mm of dried adhesive layer;

0.1 mm of dried adhesive = 0.2 mm of wet adhesive,

0.2 mm of wet adhesive = 200 g/m² approx.

After application the adhesive starts to dry whereby the surface becomes more and more tenacious until a skin is formed. Already when the surface has become a bit tenacious, the flock fibres cannot penetrate into the adhesive film as deep as required, i.e. the flocking is not anymore resistant to abrasion. Therefore flocking is possible only as long as the adhesive has not become tenacious. The period of time during which the flocking has to be completed is called «open time». When choosing a flock adhesive, one has to take care that a type of adhesive is selected with a sufficiently long open time according to the size of the parts to be flocked and to the flocking method.

Two-component systems will start to react with each other, independently of the evaporation of water or solvents. Here as well the viscosity of the adhesive increases and a proper flocking is not possible any more. The period of time during which a two-component mixture of adhesive and catalyst has to be used up, is called «pot life». Naturally the drying time of an adhesive is the longer, the longer the pot life and the open time are.



Flocking of flat part



Flocking of glove box

Flocking

The actual flocking procedure is done with an electrostatic flocking device which charges the flock fibres with a voltage of 50 to 100 kV. By this, the flock fibres jump along the electrostatic field lines from the device to any earthed surface. Therefore a prerequisite for good and even flocking is that the part coated with the adhesive is connected to the earth wire of the flocking device. If the substrate is an insulator an auxiliary construction may be necessary in order to give contact to the adhesive. The effect of the electrostatic field depends on the field strength resulting from the voltage at the equipment divided by the distance of the applicator to the part to be flocked. An even flocking requires that the applicator is moved over the surface with always the same distance (in most cases 5 to 10 cm). This is especially important when flocking depths and protruding edges as otherwise there may occur problems with uneven flocking. The perfect flocking requires a certain amount of experience and should only be carried out by experienced persons.



Flocking machine

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 recommendations of the flock producer. A too dry climate or a dried out flock may be recognized by the fact that it doesn't jump 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 cleaning

The flocked parts are dried at room temperature or in a drier and after that cleaned from surplus flock fibres. The cleaning may be carried out by blowing off, sucking off, knocking off, brushing off or by washing. Often a combination of these methods is used.



Hygrometer with correct climate

Flock adhesives

Flock adhesives may be one-component or two-component water-based or solvent-based systems. With two-component systems it is extremely important that the individual components are precisely weighed. Moreover, a suitable pigment should be added in order to dye the adhesive to the colour of the flock. Thus, on the one hand the control of the proper adhesive coating is made easier and on the other hand slightly bald spots with less flock than normal are not noticed right away. When applying a dark flock onto a bright substrate a few percents of pigments added are quite sufficient. At least 10 percent of white pigments have to be added to the adhesive for white flocking onto dark surfaces. When flocking bright flock fibres onto a dark substrate (i.e. yellow flock onto a blue base), white pigments as well as pigments in the flock colour have to be added, as otherwise an optimum covering and colour shine cannot be achieved.



Adhesive, catalyst and pigment

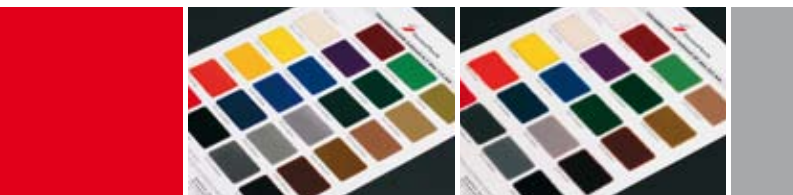
Flock

For the flocking of sheets and 3D parts mainly polyamide is used, as it is very pressure resistant (i.e. after being under pressure, the flock lifts up again and no pressure marks are visible). However, for some special cases other types of flock are used as well:

- One-way packagings are flocked with viscose (which is cheaper than polyamide).
- Rubber gloves are mostly flocked with cotton (absorbs humidity better than all synthetic fibres).
- Window channels for cars are flocked with polyester (is more light resistant than polyamide).

For normal application cases, we stock polyamide flock in 3.3 dtex / 1.0 mm, 6.7 dtex / 1.0 mm and 22 dtex / 2.0 mm in many different colours as per our colour cards. Colour shades which are not on stock may be achieved in most cases by mixing two or more flock colours. When doing this with 2.0 mm fibres, a colour blending effect happens which might even be desired for a decorative effect.

For all other types and colours please contact us in order to determine the best possible type of flock.



Polyamide colour card 1 mm

Polyamide colour card 2 mm