

Flocking systems for low  
and high volume production



**maag**flock



## Competence “Made in Germany”

With decades of experience, Maag Flockmaschinen supplies concepts, lines and equipment for flocking an extremely broad range of products around the world – from hand flocking units for model and prototype construction to customized, fully automated lines for high volume production of three-dimensional molded parts. No other manufacturer anywhere in the world offers a similar range of products and services from consulting to its own metrology. The systems and machines of the market leader are all produced in the region. They testify to top quality and competence – because they are “Manufactured in Germany”.

Flock material consists of close cropped textile fibers. When electrostatically charged, millions of these fibers – in some cases with pneumatic support – are enclosed vertically in a substrate coated with adhesive. This results in functional, durable, high-quality seamless textile surfaces. Such production is inexpensive and reliable.





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## Fully-Automated Line for Flocking Glove Boxes

Molded parts with large recesses, like glove boxes, act like a small Faraday cage, and therefore do not permit purely electrostatic flocking. A large part of the flock used would not reach the inside of the box. As a result, a combination of air and electrostatic is used in such cases. The flock is automatically dosed in an air stream, charged when it passes a high-voltage electrode and blown to the object. The flock quantity, air stream and high-voltage can be infinitely adjusted.

Three-dimensional molded parts can be flocked both with hand flocking units and in fully-automated lines. The necessary degree of automation is developed together with the customer depending on the product. Corresponding flocking lines are completely controlled over all automation stages and adapted in their modular design to the individual needs of the customer. Whether it is auxiliary electrodes, nozzle or movement adjustment – extensive detailed knowledge is required for a customized design. However, the engineering and consulting competence which forms the basis for comprehensive know-how in the areas of technology, organization and process planning remains decisive during the entire project planning phase.

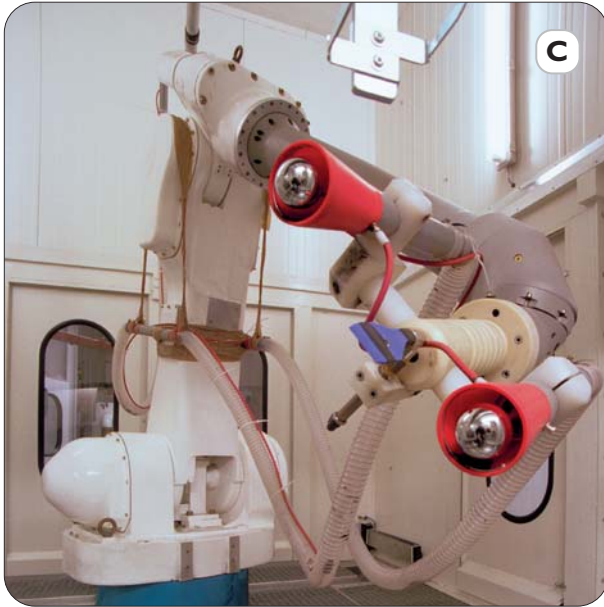


A professional portrait of Roberto Schuster, CEO of Schuster GmbH. He is a middle-aged man with dark hair, a mustache, and glasses, wearing a grey suit jacket, an orange shirt, and a striped tie. He is smiling and has his arms crossed. The background is a blurred industrial or office setting with white panels and a window.

*Roberto Schuster, CEO of Schuster GmbH,  
"At Maag I stood at the door more or less with a glove  
compartment under my arm. Soon thereafter a complete  
flocking line was installed at my company. It enabled me  
to comply with my customers' closely calculated economic  
specifications regarding the reliable production of high-  
quality parts."*



## Fully-Automated Lines for Flocking Glove Boxes



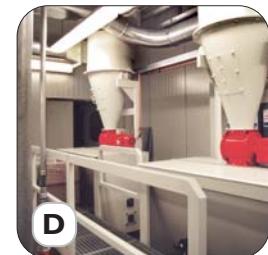
High volume requirements in production also make comprehensive automation imperative for flocking. The customer's request for absolute process reliability is best fulfilled with a practical interlinking of automated line modules. On the other hand, the smallest possible amount of manual labor is required for flocking processes of this kind. All order parameters are specified, verifiable and can be recorded with error logs via PLC. In addition, the flocking quality is checked in final inspection with our testing equipment.



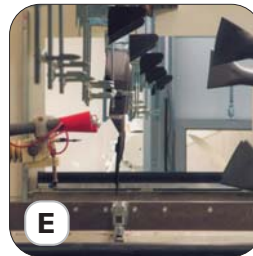
**A.** Widely varying requirements are placed on technical molded parts. Many substrate materials require appropriate pre-treatment.



**B.** The adhesive is applied in a spray booth: either manually, via manually-guided systems with partially automated movement sequences or fully automatically by robot.



**C.** In a complex line, flocking can be carried out either with a mechanical swiveling unit and moving axis systems or with a freely-programmable robot.



**D.** For special product requirements, the parallel use of different flock types is necessary. This places the highest demands on planning, construction and installation of the line. We develop reliable solutions with separate material circuits for this purpose.

**E.** In the pre-cleaning stage excess flock material is vacuumed off and returned for re-use in the circulation system.



**F.** Fully automatic drying process with suspension conveyor system.

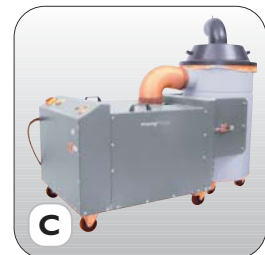
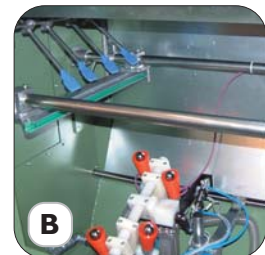
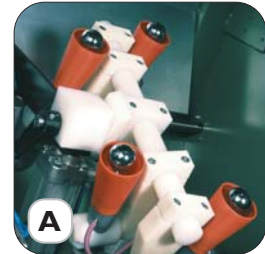
**G.** The results of final cleaning are ready-to-install components which are virtually free of loose flock fibers.



## Semi-Automated Lines for Flocking Molded Parts

Even in semi-automated lines, the entire core process is automated. Flocking takes place with PLC support, controlled and free of manual influences.

- A.** Flocking is carried out via blowing nozzles with a PLC-controlled movement arrangement.
- B.** As the next step in the cycle, pre-cleaning is controlled via programming.
- C.** A mobile extraction unit is used to collect the excess flock material. It vacuums off the entire line with permanent vacuum, which ensures minimized flock carry-over to the outside.
- D.** As in fully-automated lines, the modern, high-voltage supply, which is also PLC-supported, ensures process reliability. The high-voltage connected to the actual parts has a crucial effect on the quality of flocking.





## Lines for Flat Surface Flocking of Blanks

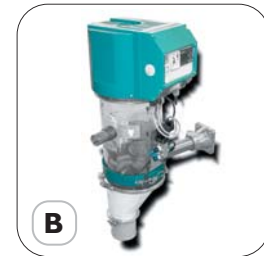
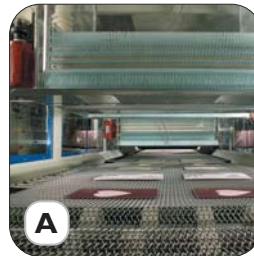
Lines for flocking surfaces are usually used for the continuous flocking of fabric yard goods, films or paper; however can also be used for flocking metal, plastic or wood panels and flat objects. The design of the line depends on the substrate to be flocked, the planned production speed and the flock type.

**A.** PLC-controlled DUO dosing boxes ensure an even flock application and provide for high process reliability.

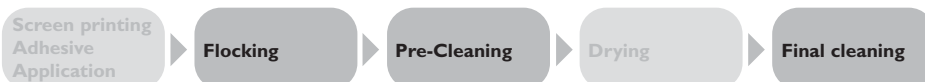
**B.** A pneumatic flock recovery system assures gentle material transport into the machine circuit.

**C.** The vacuum technology in the central flock collection and extraction unit removes excess flock material continuously under vacuum.

**D.** Pre-cleaning unit



**E.** The entire process is completely controlled via PLC and enables permanent fault monitoring and traceability; all processing and voltage parameters are recorded continuously.

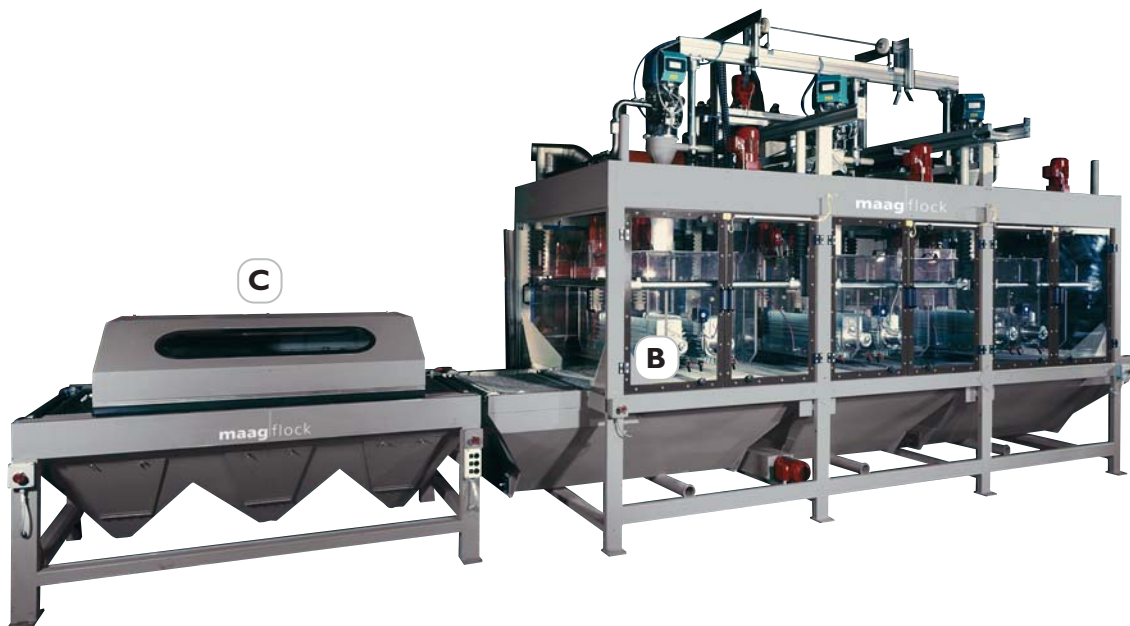
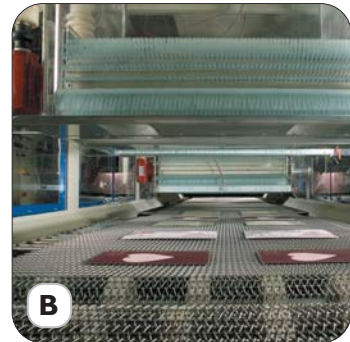
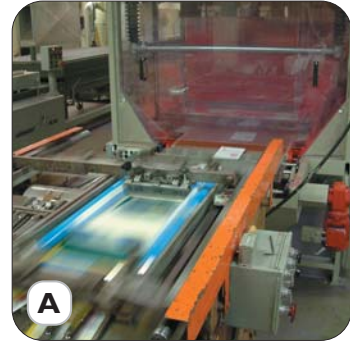


## Lines for Flocking Greeting Cards

In the line shown, folded greeting cards are flocked at high speed while being passed. In this case a standard line was modified for flat surface flocking on the customer's specific request.

- A.** The adhesive is applied in one or two rows with a screen printing machine.
- B.** Flocking is carried out via several DUO dosing devices. Excess flock from the machine and the pre-cleaning unit is continuously collected by an extraction unit and fed back into the flock dosing units.
- C.** The pre-cleaning system is an encapsulated system in order to not erect the cards. Excess flock is blown off and extracted under vacuum.

The transfer dryer is designed individually depending on the product, the production speed and the adhesive used.



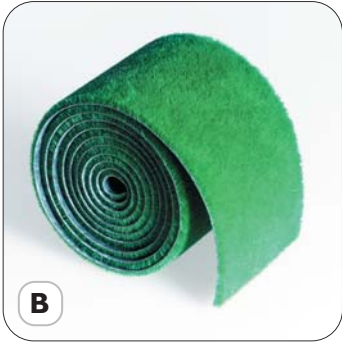
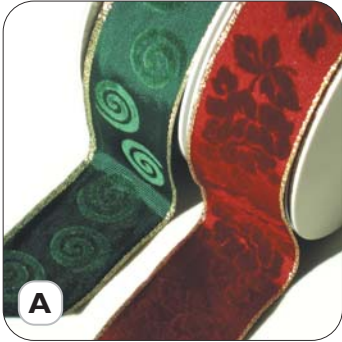


# Lines for Flocking Ribbons

Ribbons are continuously flocked while being passed. Flocking can be one or multi-row up to a ribbon width defined by the customer.

Examples:

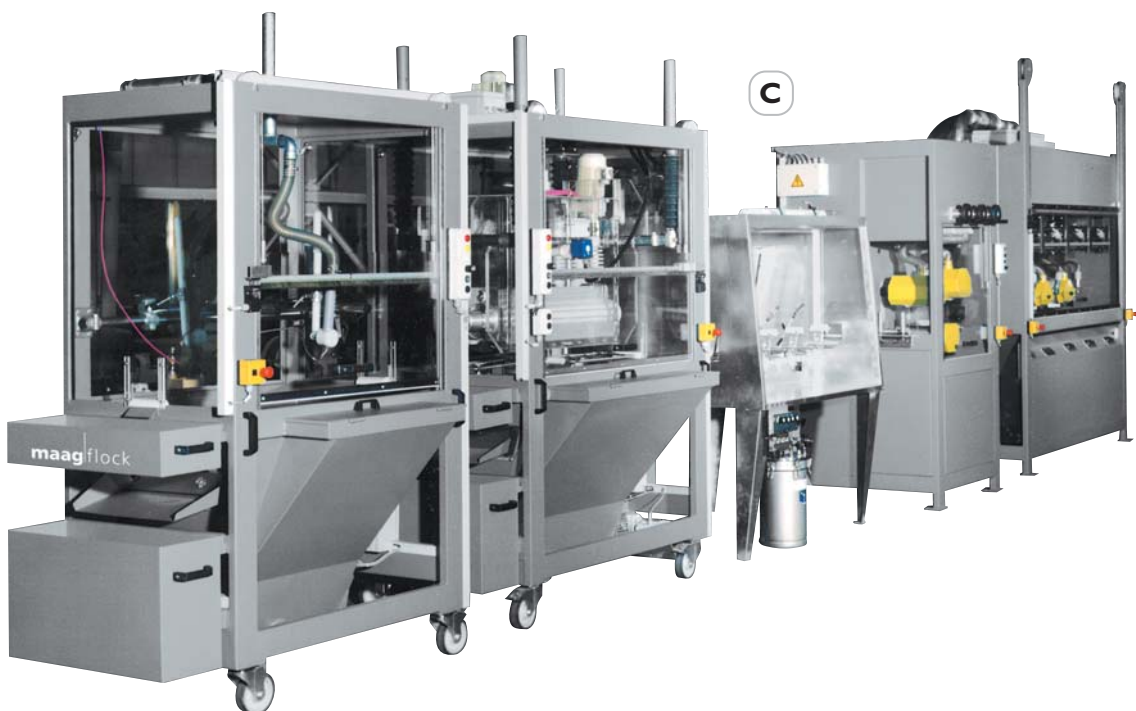
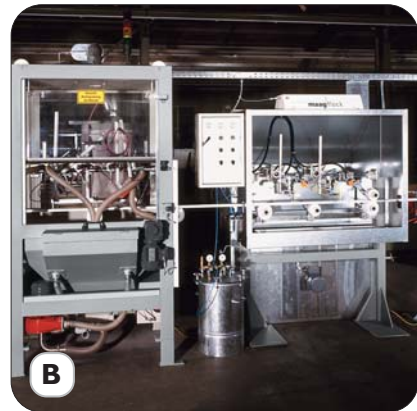
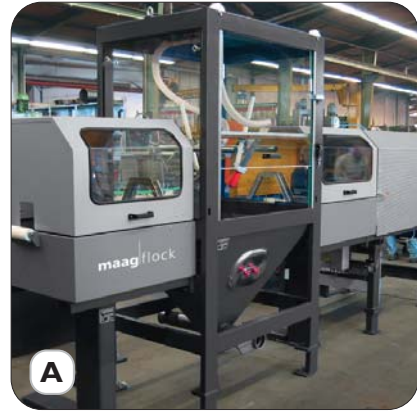
- A. Gift wrapping ribbons
- B. Flock tape



## Lines for Flocking Profiles

Continuous profile flocking basically is feasible for a big variety of profiles. Depending on the substrate, line systems with different characteristics are employed, for example for EPDM and TPE profiles, or hard profiles of aluminum or PVC. Flocking is electrostatic and electrostatic-pneumatic, even enabling high-quality flocking of recesses and undercuts.

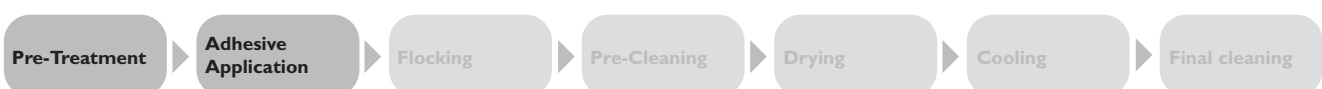
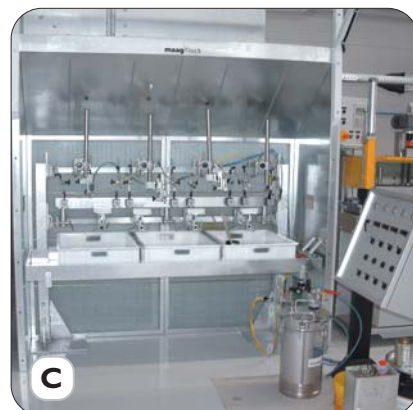
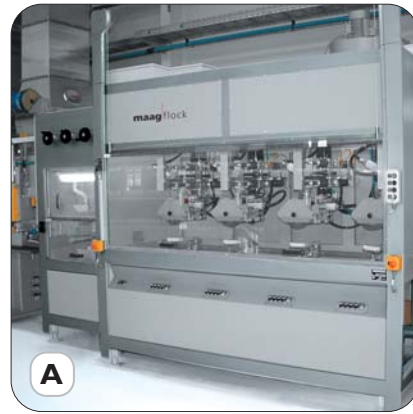
- A.** *Customer-specific integration of profile flocking machine*
- B.** *Flocking aluminum profiles*
- C.** *Machine combination for rubber flocking*





## Line Components for Profile Flocking

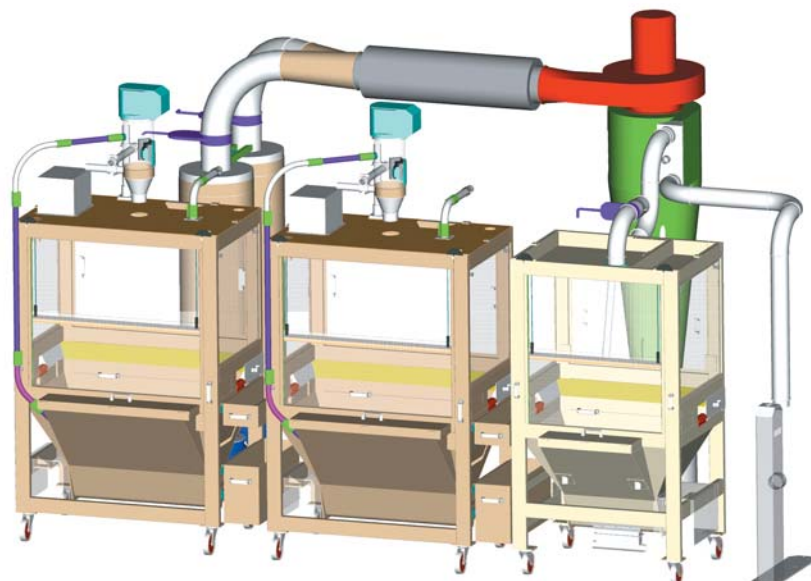
- A.** Pre-treatment is carried out via mechanical roughening. The abrasion brushes can be continuously moved and swiveled horizontally and vertically, which allow to match them to all profile shapes.
- B.** As an alternative pre-treatment method, plasma-treatment (electrochemical process) is used.
- C.** The adhesive is applied with rollers, brushes or micro nozzles.



## Lines for Flocking Rubber Profiles

Depending on the type of profile used, the separate line components are combined practically and individually.

- A.** P/F-800-L flocking machine for mere electrostatic profile flocking with automatic flock return.
- B.** P/F-E/P flocking machine: The electrostatic-pneumatic flocking guarantees that even with complicated shapes, undercuts and recesses can be reliably flocked.
- C.** Excess flock material is vacuumed off in the pre-cleaning section.
- D.** Flock extraction and collection unit with refilling option for fresh flock.



Pre-Treatment

Adhesive Application

Flocking

Pre-Cleaning

Drying

Cooling

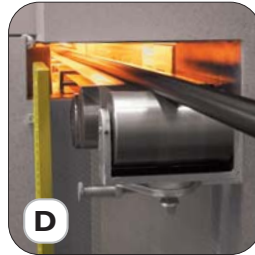
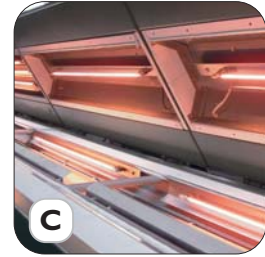
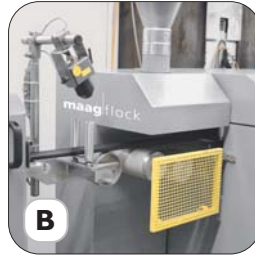
Final cleaning



## Drying

Hot air in combination with an IR heating section at the dryer entrance guarantees fast heating up of the profile surface and the uniform drying of the adhesive.

- A.** *THL-IR-1,8 G dryer*
- B.** *Temperature monitoring*
- C.** *Dryer open with radiator in operation*
- D.** *IR transfer dryer*
- E.** *Control panel*



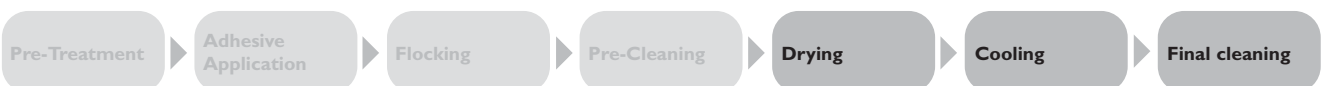
## Cooling

- F.** *The adhesive is solidified in a cooling section to prevent the flock surface being damaged during final cleaning. At the same time, the profile cools for improved handling.*



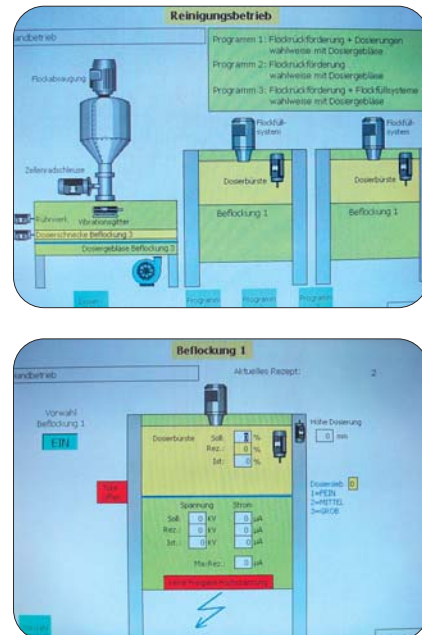
## Final cleaning

- G.** *In the final cleaning section, adhering particles are brushed off from all sides and vacuumed off via a cyclone.*



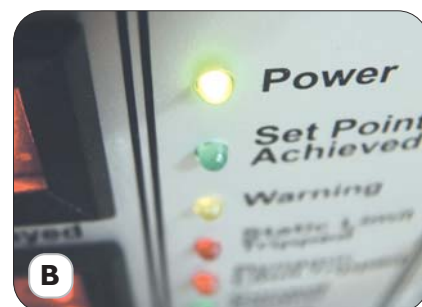
## Control and Switch Cabinets

A higher-level control system with a well thought-out control concept reflects on the line control of the entire line; all command values are transferred by means of bus systems. The integration in larger production lines is based on customer requirements to the greatest extent possible, however the control system also operates independently if necessary. Basically, all common signals can be adopted on the customer side. Illustrated menus simplify operation and provide for high user friendliness.



Screens of the line control system

- A. The HST high-voltage controller is an important component of every line control system.
- B. Great importance is placed on safety. Programmable monitoring limits of the high-voltage supply ensure smooth operation.





## Machines for Flocking Textiles

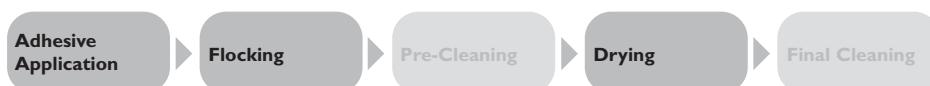
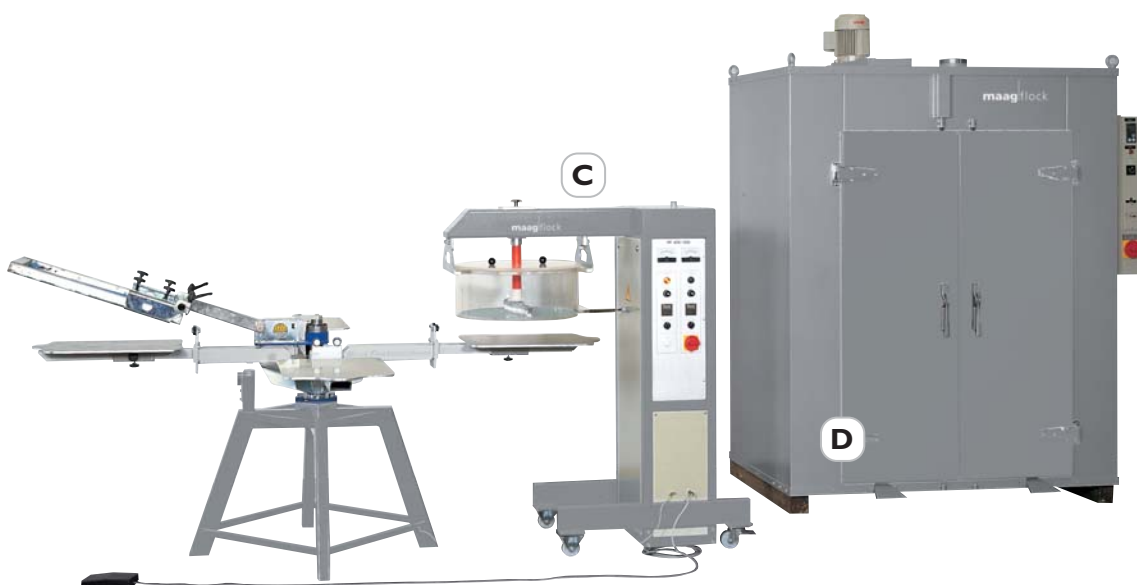
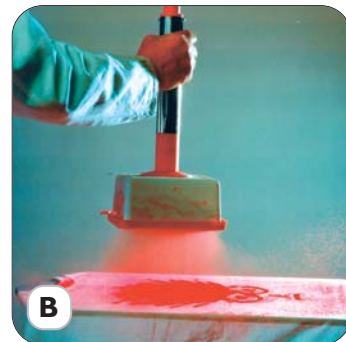
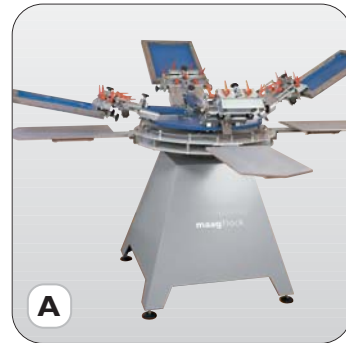
Flock is particularly well-suited for use on jerseys, T-shirts, work clothing and other textiles. The velvety surface has a high covering capacity even on dark fabrics, is very durable and retains its color brilliance even after frequent washing. For motif flocking of T-shirts and sportswear, the adhesive is applied with the screen printing method. For smaller lots, textile flocking is very economical when applied with hand flocking units, and for medium volume production with semi-automated devices.

**A.** Adhesive application with KDM-4/4

**B.** Manual flocking with HEK 100

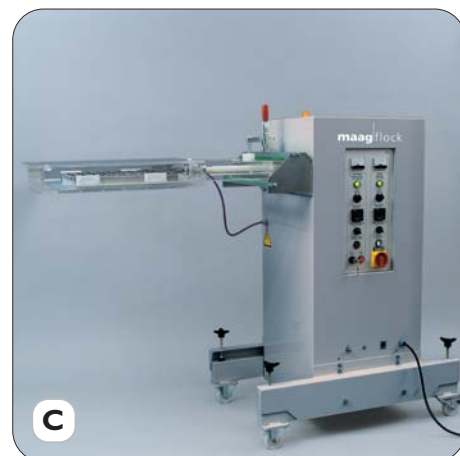
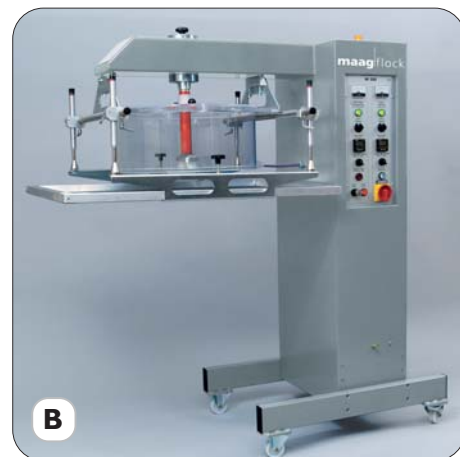
**C.** RF 500 flocker

**D.** TRUS-160 KT dryer



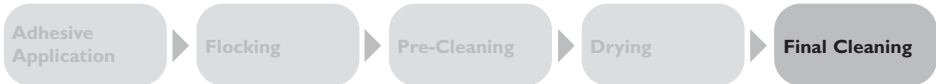
## Machines for Flocking Textiles, Floor Mats and Blanks

- A.** The RF 500 has proven to be outstanding for flocking textiles and flat parts. It consists of a high-voltage electrostatic unit, the control unit and the actual flocking unit with a round flock container and rotating brush. Both the rotating speed of the brush and the dosing time, height and duration of the connected high-voltage can be individually set-up.
- B.** When combined with a screen printing carousel and supplemented with a screening frame, the RF 500 can also be used as a multi-color flocking unit.
- C.** The FF 380-430 flat flocer was engineered for integration in screen printing carousels. The ultra-flat design enables operation even in tight spaces.



# Machines for Cleaning Flocked Textiles

After drying of the flocked textiles, the excess flock is removed with the TS-C machine. This is carried out by a combination of vacuuming off with strong turbulence and brush support. The surface is brushed off by the upper and lower brush at the inlet slit. In addition, a special air guidance with a strong air flow causes the flocked textile to vibrate. Excess flock is vacuumed off into a collection bag. Various attachments, e.g. VR-TF for transfer cleaning, are available as expansion options.





# Lines for Flocking

## Small Objects

The range of possible applications for flocking lines is extremely wide. Flocking solutions can be matched to the individual customer requirements and realized at any automation level. Correspondingly high engineering competence is required for each individual line design.



## Transfer Lines for Flocking Molded Parts

An electrostatic flocking system is combined with an electrostatic-pneumatic flocker for flocking complicated objects.

We also supply flocking systems for later integration in existing lines at the customer's plant.



Pre-Treatment

Adhesive  
Application

Flocking

Pre-Cleaning

Drying

Final cleaning

## Hand Flocking Units

Universal units for manual flocking are used in the hobby and model construction, as well as in laboratories or in prototype construction.

**A.** *Mini flocking unit*

**B.** *Mini flocking unit with various applicators and power supply unit*

The HEK 100 is designed for industrial applications.

**C.** *HEK 100 with various applicators*







**A.** The FT 1000 flocking table is the ideal workplace when combined with a hand flocking unit. The supporting surface is designed as a screen so that excess flock falls into the funnel below and then into a collection container. A spring-loaded support serving as a counterweight makes work even easier.

**B.** The KFG 800 cabin flocker features purely electrostatic operation and leads to a very dense, even surface by flocking from the bottom up. First flocking material is applied to the grounded bottom of the cabin. When the high-voltage is switched on, the flock jumps upward and penetrates the adhesive-coated surface of the objects.



## Manual Units for Flocking Molded Parts

### A. EPF electrostatic-pneumatic flocker

Three-dimensional products, hollow bodies and deep recesses form a Faraday cage. The interiors of these objects can only be flocked with the electrostatic-pneumatic method. The EPF is used for universal flocking ranging from individual prototypes to medium volume production. It consists of a flock hopper, flock dosing system, high-voltage generator and a control unit.



### B. FK 1200-N flocking cabin

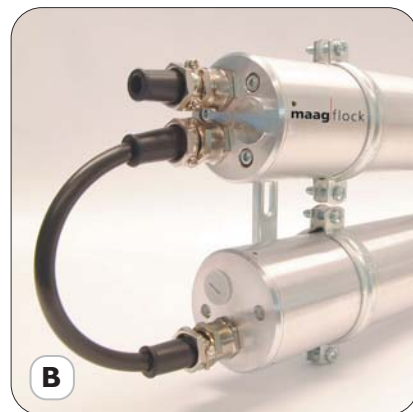
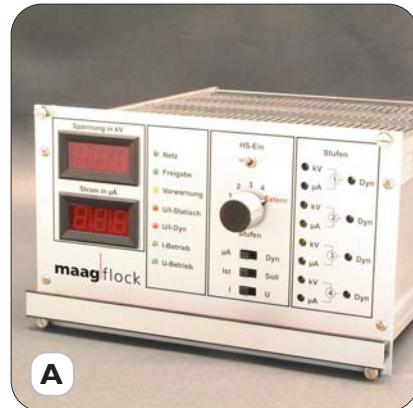
This flocking cabin with extraction offers sufficient working space for the use of manual flockers. The main excess flock falls down into the collection container, while the rest is vacuumed off to the rear. When combined with the mobile Dustomat 160 extraction unit, this fulfills the valid guidelines for workplace safety and hygiene.



## High-Voltage Generators

An important component of every flocking line is the rugged, high-quality, linkable high-voltage generator of separately operating components. These are controlled via PLC, and can thus be integrated in fully-automated production. Different devices are used for various performance classes. As a safety-relevant component, the high-voltage generator always complies with the latest valid standards and technology.

- A.** High-voltage control with HST 01/03
- B.** HER high-voltage generator
- C.** High-voltage control, integrated in the front of a control cabinet
- D.** HE 2000 mobile high-voltage generator, also suitable for stationary installation
- E.** Control cabinet for laboratory use with HST/HER





## Testing Equipment

For the evaluation and analysis of flocking results we offer a wide range of testing equipment. The measuring and test units for all applications have long proved themselves in user plants, in laboratories of the car manufacturers and at universities. We offer precision technology for all common test standards.

### MT 501 tear tester:

A proven test method is the tear test. No need for subjective, visual evaluation. A measured value is displayed in newtons and printed out. Tests can be conducted on even very small, uneven parts, like those frequently encountered in the automotive industry.





The DMB 10 conductivity meter measures the electrical conductivity of the flock. With electrodes available as an option, the conductivity of the adhesive and the ground leakage current of the flocked objects can be measured. The temperature is measured with the contact sensor or contact-free with the IR sensor.



To evaluate the quality of the flocked products, the APG 1000 abrasion tester is used. The speed and number of strokes can be selected as desired. The device is also suitable for testing the abrasion resistance of leather and painted plastic surfaces.



The SPG 1000 rise time tester examines the behavior of the flock in an electric field. In accordance with the standardized test specification, a sample of the flock is sifted onto the grounded base plate. The time the flock requires to jump from the plate at a defined high-voltage is measured.



The HMG-D high-voltage meter with a measuring lance measures the high-voltage present at the electrodes of the flocking machines. The measuring range is 0-100 KV.

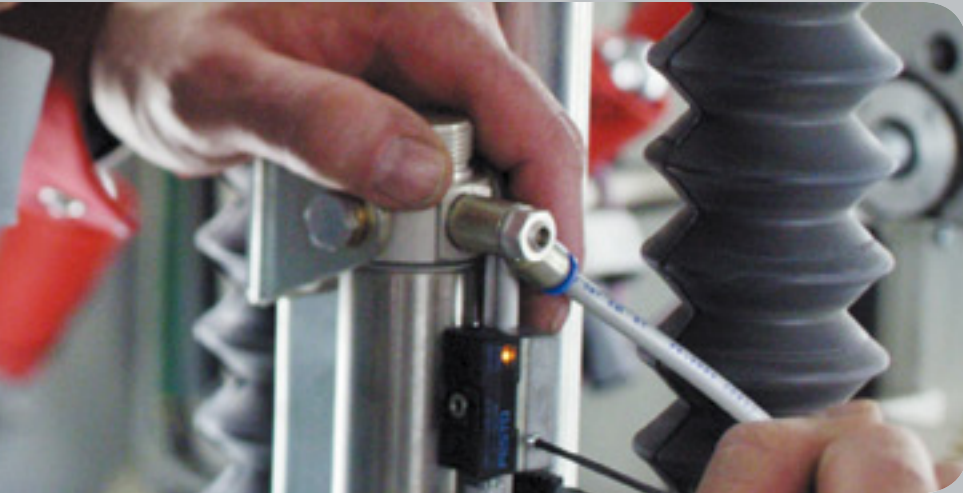


Especially with larger lines, the siftability of the flock is an important variable. With the RPG 1000 the flock is filled into the sifting drum, the residual quantity is weighed after a defined number of rotations and visually evaluated.



The flock shape provides an optical evaluation of the flock. This is achieved by measuring the length and shape, as well as by checking the cut ends. A sample of the flock is placed on the glass carrier, scanned and optically measured for this purpose.

Made in Germany



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