Paper B47

Modification of Leather Surface Characteristics with Fiber Coating: Flocking of Leather

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Abstract
The fact that leather's surface of use is brought touch and appearance in an unusual way has become the main objective of finishing in recent years. Because some surface defects cannot be overcome with a classic type finishing, it possible for them to be evaluated with coating techniques. Coating must be aimed at obtaining an alluring product besides its compatibility with the leather properties' being important and in addition to its overcoming the surface defects.

In the study, we conducted some studies on the evaluation of the leathers, which are of low quality and contain surface defects, aiming at obtaining different surface characteristics. We aimed to bring ease of use and alternative appearance and touch by creating a fibrous surface through the covering of the flocked, which is an important group of synthetic leathers, and alcantara's applicaitons on leather. In order to obtain an effective fibre surface in different patterns and smooth applicaitons, different binder types, flock formulations and flock fibres were tried, their characteristics were determined thanks to imaging techniques and the sufficiency of fibres' bindings were examined through some physical tests. According to the results, it was observed that in the products of bag, shoes, dress and accessories, on which fantasy appearance and different patterns were applied, polyurethane binder is at the sufficient level and it brings in more superior binding characteristics than acrylics binder.
Keywords: Leather; flocking, surface modification, polyurethane binder; acrilic binder.

1. Introduction
Even though finishing is as old as the history of leather production, the developments in a way of pushing the limits in recent times in this field keep the leather products on the agenda as a component of fashion. Thanks to the creativity in the process of finishing, the characteristics to affect the demand of customer bring at the surface of leather and with the effects of new appearance, this product gains a trendy quality for all ages.

Nowadays, people work with the approach of both keeping the demand for leather alive and covering the surface characteristics of leather, worsening day by day, with different applications, and with the approach of the increase of leather production's profitability. Although the obtention of a natural and vivid surface appearance thanks to finishing practices made on grain surface is preferred application, new surface output with the buffing the using surface offers a homogeneous and velvety surface use to the users. While these applications applied to the leathers not containing surfacial defects and structural defetcs manipulate the demand for leather, the evaluability of the leathers, containing surfacial defects in the depth not to be covered by finishing and the fibre distortion of same level, with the applicaitons to be made is important in terms of profitability. The fact that these surfacial and structural defects are coated thanks to flock application, which is an important option in the snythetic leather surface modifications as an alternate, the evaluation of low quality leathers with the appearance of coated fibrous surface and the increase of their usability by transforming them into alluring produtcs were regarded as a new approach. Nowadays, when the clothes with fibrous surface are more preferred in terms of comfortableness, the fact that the properties in natural suede leathers have worsened in the course of time and loss of performance are regarded as an important disadvantages in terms of use. In the alcantara and flocked products, on the other hand, the performance depending on

the fastness properties of the synthetic fibre coated on the surface is considered as the advantage of these applications.

As a matter of fact, flocking known for a long time is applied to all kinds of goods and a special surface decoration is formed.[1] Flocking is a type of pigment application used to form velvety, artificial leather and textile surface with special appearance at the surface by fixing fiber or fiber duts to fabric.[2] The coating materials protect, functionalize, and lubricate surfaces.[3] The ease of use that suede creates in terms of customer and its extraordinary attraction increased the studies of bringing these characteristics in textile. Even though the fibre coated and flocked textile products produced with the studies in this way are extremely successful in terms of appearance of beauty on the surface and their fibrous surfacial characteristics which do not worsen in time, they remained as counterfeit goods because of not substituting the naturalness of product. Also, the weakness of texture at the base formed of textile material gave rise to performance losses of surface texture. New products, which have stronger texture, whose performance are high and whose characteristics were modified will be able to be obtained with the use of leathers, containinig surfacial defects, as base material.

In our study, we focused on overcoming the problem of texture weakness in synthetic suede applications by using natural leather and on the evaluation of the products that are non-standard and cannot be sold due to surfacial defects on the leather. Using properties of leather surface were developed thanks to flocking applications and new products with natural leather based and synthetic surface were obtained by making modifications aiming at overcoming the technical problems of natural suede fibres. By this means, we aimed to generate demand for the evalution of the leathers of sub-standard quality.

2. Experimental

2.1. Materials

In the study, fibre coating applications were carried out in order to improve the surface appearance and effects for the improvement of the sales chance of the sub-standard leathers, and dyed crust leathers were used as leather material. The defects on the leathers are skin defects that impair the appearance and touch, and these defects require intense finishing applications and pigment coating as prevalently primary and secondary defects. Water based polyurethane binder and acrylic binder were used in the binder formulation. On the other hand, the flocking for the obtention of fibre texture in different thickness, length and quality are at 1.7 dtex thickness and 0.6 mm in length. Nylon flock was used in the experiments.

2.2. Method

2.2.1. Flocking procedure

Flocking includes the procedures of applying flock powder over the surface where an adhesive layer was applied and its binding. The flocks to be adhered to the surface can be formed of fiber and they can also be metal particles which are powdered.[4] While applying a textile, velvety or brush like surfaces to almost any materials, a fascinating surfaces characteristics are possible to obtain. Flock applied materials are widely used in both the technical area and the household.[5] And also draw attention on T-shirts, packaging for perfumes, car glove boxes, car head liners, floor coverings, eye liner brushes, scrubbing pads in which consumers are always looking for something different and unusual.
In the study, flocking applications were made to the finished leathers, which are classified as sub-standard quality and unsold due to some surface defects, by applying water based polyurethane binder and acrylic binder types.

The application of flocking was performed with electrostatic method. In the procedure of flocking with electrostatic method, the electrostatic field used is 40.000 V, the flocking sieves are respectively 40-25-40 Mesh, stencil Mesh interval is, on the other hand, 40 Mesh. Machine speed is 7 mt/min, and

drying temperature is 150 °C. Application of flock coating system is seen in the Figure 1.

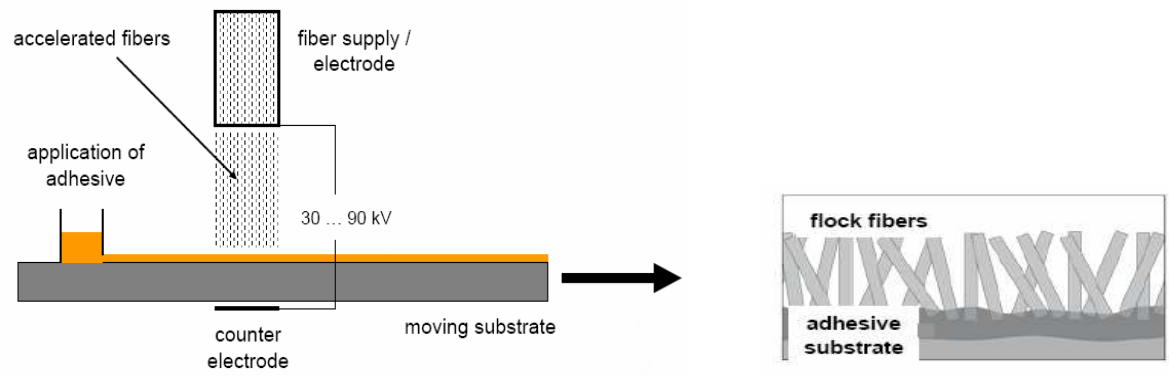

Figure 1. Application of flock coating system

Flocking procedure was performed by applying over 2 different binders. When polyurethane binder is chosen as binder, procedure recipe was applied as it is in the Table 1, and when acrylic binder is chosen as binder, procedure recipe was applied as it is in the Table 2.

Table 1. Polyurethane binder application

Product	Amount of product
Polyurethane binder	*100*
Thickening agent	*2*
Drying retarder in rotary screen-Fixing agent	*4*
Cross linker	*5*

Table 2. Acrylic binder application

Product	Amount of product
Acrylic binder	*100*
Foam stabilizer	*2.5*
Thickening agent	*5*
Fixing agent	*3*
pH regulator	*0.5*
Foam repressive	*0.025*

The abrasion test of leather samples was carried out according to DIN 53863-4 standard method with Martindale test device.[6]

2.2.2. Surface characterization of flocked leather samples

The analyses of surface characterization of the flocked leather samples were carried out with LEICA L5 FL model light microscope and with Hitachi TM-1000 table-top Electron Microscope.

3. Results and Discussion

In the experiments made with water-based polyurethane binder, no problem was experienced in the application and binding of the flocks. The flocked leather products obtained were subjected to Martindale abrasion test. According to martindale test results, it was established that Martindale cycles under 12 Kpa load was 1500 and it was determined that the results obtained were at sufficient level in the field of bag, shoes, garment and accessories. Besides, it was understood that these results should be improved in the fields of home textile and upholstery, and it was determined that surface oiliness must be overcome for the improvement of binding and surface areas must be enlarged.

In the experiments where acrylic binder was used, trouble-free practice of the flocks was able to be made and the binding occured in the application. In the Martindale abrasion tests of the flocked leather products produced with acrylic binder, on the other hand, it was determined that Martindale cycles under 12 Kpa load was 400-500. It was established that the flocks' binding with acrylic binder although it was not as much as polyurethane showed that the results obtained could be used at the limited levels in the fields of bag, shoes, garment and accessories. Furthermore, it was understood that

the results will increase more for the flock applications thanks to the modification of acrylic binder formulations and to the improvement of surface characteristics.
In our study, some pictures of leather products that have become finished products by flocking are as seen in the Figure 1. The images of flocked leather samples obtained in the Light Microscope are seen in Figure 2. The SEM images of leather flocked products in 1 mm, 300µm and 100µm are seen in Figure 3. In Figure 3, the fibres on the leather's surface are seen extremely clear in SEM images in 100µm.

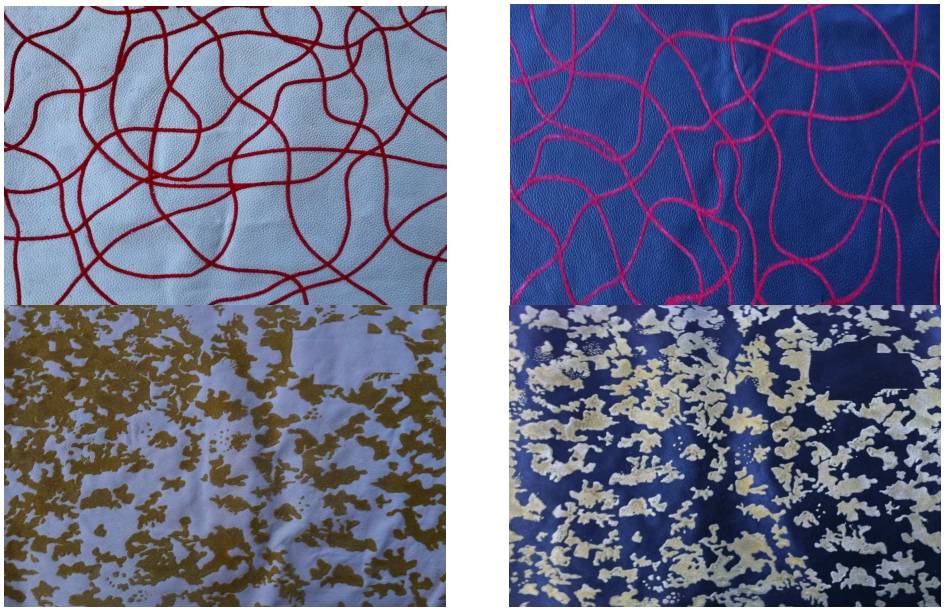

Figure 1. The leather products obtained with flocking application

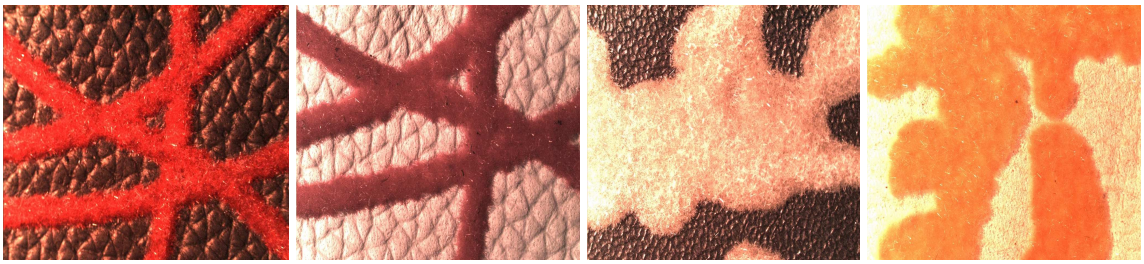

Figure 2. The images of flocked leather samples in the light microscope

4. Conclusions

Nowadays, the demand of leather goods is increased in paralel with improving the product usage field with the studies on new appearance and touching properties. Flocking is a research based on new technics to carry out velvet, faux leather and textile surfaces with special view on the surface with the paste of fiber or fiber powder to the fabric. Actually, although it is highly successful for a long time, it was insufficient on the substitution of naturalness of suede made of leather. However, obtaining homogeneous appearance on the natural leather surface with flocking will be an alternative for a new modification of this natural products surface properties.

In this investigation, fiber coating was made with flocking with water based polyurethane binder and acrylic binder to the leather that are completed wet processes. Patterns created leathers surface properties was determined and Martindale abrasion test was carried out. According to the investigation results; polyurethane binder using in the flocking procedure gives enough performance criterion on the field of bag, footwear, garment and accessory, but it has insufficent properties on the home textiles

and upholstery field. Improvement studies of this properties with the solvent based binder is still going on. In the research, flock fibres is placed in patches on the leather. As a result of this work, naturalness can be saved and disadvantages like fading of colour, staining with time and the lack of homogenous appearance of suede can be removed.

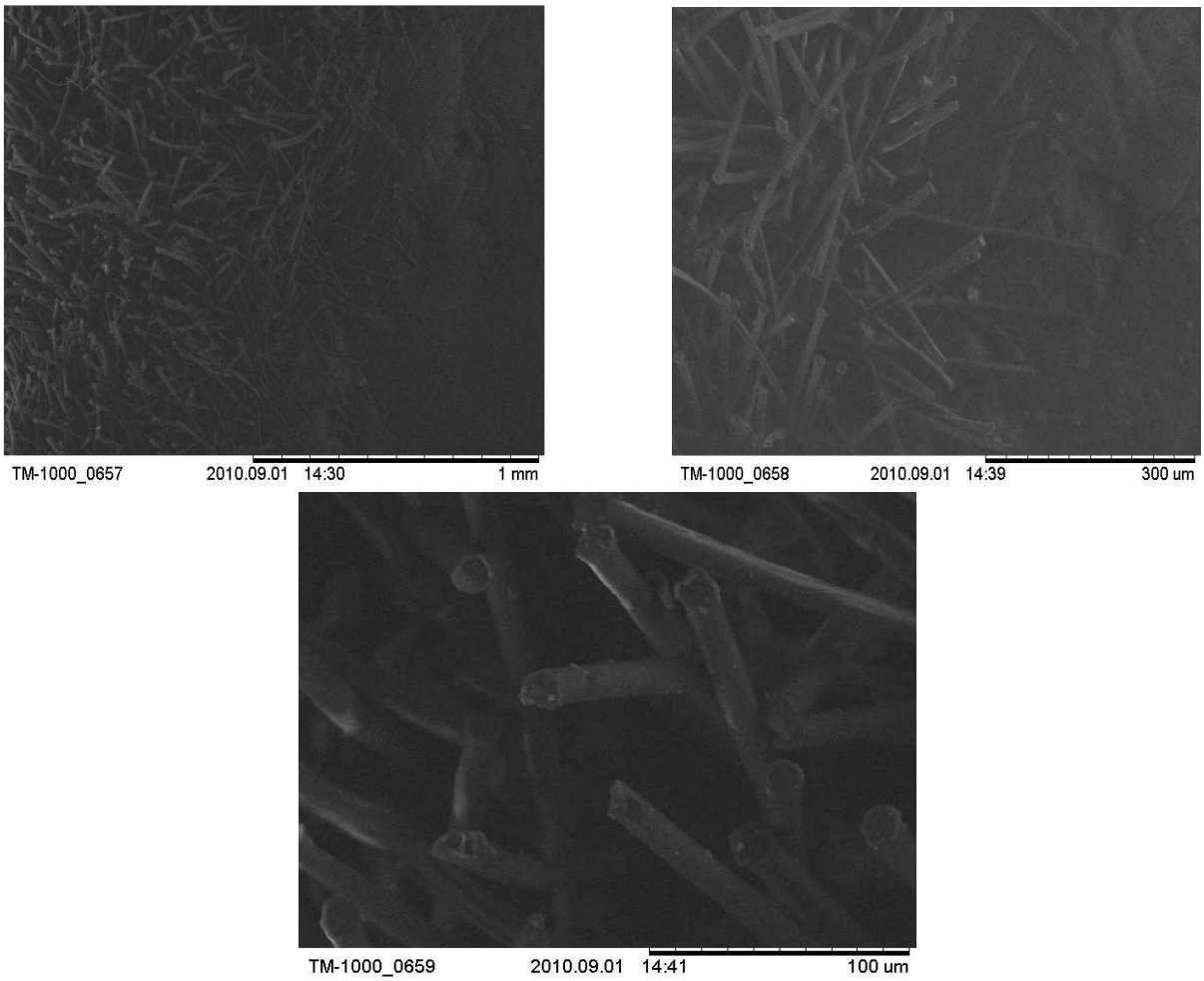

Figure 3. SEM images of the flocked leathers in 1 mm, 300µm and 100µm

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