

# Grain side leather decoration

## Ukrašavanje lica kože

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### Abstract

Leather as a valuable material for the production of clothing, footwear, haberdashery, upholstery for household interiors, for all means of transportation and trimmings requires many treatment processes in order to fulfil the properties desired by consumers. From a functional point of view, the finishing processes on the grain side of the leather play an important role, including topcoating, lacquering, varnishing, embossing, etc. The grain side of the leather is protected from external influences and defects and damage are concealed. Leather finished in this way is an ideal basis for various aesthetic decorations that give the leather its final appearance and functionality. There are a number of leather decoration processes such as: Engraving, embossing, carving, drilling, embroidering, printing, painting, knitting, tattooing, various laser beards, etc. Each of these operations is carried out in the manufacture of leather goods for different applications and does not affect the functionality of the leather. It is an extremely important creative and design component that extends from finishing to the final stage of decoration, even for items that are not unique.

**Keywords:** leather; finishing processes; decoration

### Sažetak

Koža kao vrijedan materijal u proizvodnji odjeće, obuće, pozamanterije, presvlaka za uređenje interijera u domaćinstvu i za sva prijevozna sredstva zahtjeva mnoge procese obrade da bi zadovoljila tražena svojstva potrošača. S funkcionalnog stajališta važnu ulogu imaju završne obrade lica kože (proces dogotove) u koje se ubrajaju apretiranje, lakiranje, pokrivno bojanje, utiskivanje i sl. Lice kože se štiti od vanjskih utjecaja, skrivaju se nedostaci i oštećenja. Ovako dogotovljena koža je idealna podloga za različita estetska uljepšavanja koja koži daju konačan izgled i funkcionalnost. Postoji niz operacija ukrašavanja kože kao što su: graviranje, utiskivanje, rezbaranje, bušenje, vezenje, tisak, oslikavanje, pletenje, tetoviranje, različite laserske obrade i sl. Svaka od ovih radnji provodi se u proizvodnji kožnih artikala različite primjene i ne umanjuje funkcionalnost kože. Izuzetno je važna kreativna i dizajnerska komponenta koja se proteže od procesa dorade sve do završne faze uljepšavanja i kod artikala koji nisu unikatni.

**Ključne riječi:** koža; obrada lica; ukrašavanje

### 1. Introduction

Products made of refined leather have always existed in the history of mankind, and leather processing is one of the oldest human activities. Leather decoration has changed from century to century with the development of human consciousness and the desire to embellish objects. With technical progress, the types and methods of decoration also change. The finishing of tanned leather in the narrower sense includes processes to refine the natural surface such as finishing, dyeing, varnishing, printing, etc. The aim of finishing is to protect the grain side of the leather, cover defects and possible damage and achieve various functional and visual effects [1]. Leather finished in this way is an ideal basis for various aesthetic finishes that give the leather its final appearance. Aesthetic characteristics are extremely important for the overall experience of a certain product, especially when it comes to products such as: clothes, shoes, haberdashery, covers for car seats and furniture, decorations for interior decoration, etc. Processing the grain side of leather can achieve the desired aesthetic characteristics that will make the finished product fashionable, while at the same time concealing any leather damage [2- 4]. Due to its specific structure, leather can be

subjected to various finishing processes without compromising its functionality and utility value. The quality of leather for the manufacture of haberdashery depends on the type of leather, the degree of processing and preparation for further processing and is usually defined by the requirements for color fastness and resistance to various stresses to which the finished products are subjected. In practice, various markings or decorative patterns are often applied to bags, belts, wallets and shoes. The quality of the imprint on the leather depends on its surface texture, the surface changes caused by frequent bending during use and wear, and its resistance to tensile stresses [5]. In addition to their practical use, leather products also have a decorative function. As early as the fourteenth century, leather was combined with wood to create chairs, tables and benches with a skill that was tantamount to real art. The situation was similar with upholstered furniture, casket and jewelry making and bookbinding [5, 6]. There are a number of leather decoration techniques such as: Engraving, embossing, carving, drilling, embroidering, printing, painting, knitting, tattooing, various laser processing (engraving, cutting). Each of these operations is carried out in the manufacture of leather goods for different applications. Regardless of the fact that some of items are not unique, the creative and design

component, which extends from the finishing process to the final stage of embellishment, is of great importance [7].

## 2. Methods of leather decoration

### 2.1. Leather embossing

In leather embossing, raised patterns are created on the surface of the leather by applying pressure. Leather lends itself well to embossing and this type of processing is widely used in home workshops and in industrial production. In industrial leather production, embossing is used to imitate different patterns on leather with a corrected grain surface. The patterns can cover the entire surface of the leather or only the desired parts. The temperature and pressure during embossing are important to ensure that the result is durable. Parameters adapted to the leather to be embossed ensure a longer-lasting, stronger, cleaner and more durable relief shape [8]. Before embossing, the flesh side of the leather can be glued with foam so that the resulting embossed pattern is clean and retains its depth. Sometimes fabric is also glued to the flesh side of the leather to prevent the motifs, which must remain embossed, from stretching and flattening. Embossing on the leather can also be achieved by applying pressure and temperature without prior preparation of the flesh side of the leather. Deep embossed motifs can be stabilized with fillers. There are a variety of filler materials that can be used, from paper fillers to hot glues, but the key factors are the stability and flexibility of the filler material. Embossing is carried out on hydraulic presses or rollers. Due to the longer exposure time, designs embossed with hydraulic presses are more stable than those embossed with a roller. Almost any type of leather can be embossed. However, the embossing process must be adapted to the properties and type of leather. The higher the pressure and temperature and the higher the humidity of the leather, the more permanent the deformation of the collagen structure. The pressure and temperature limits that can be applied depend on the type of leather being pressed. Patterns are often imprinted to reflect the grain structure of the leather from different animals. Sometimes it is difficult even for experts to determine whether the leather really comes from an animal or whether it is embossed leather. An embossing process in which the leather is pressed without the use of pigments or color is called blind embossing. Only high pressure and heat are used for embossing [9].



Figure 1. Embossing the leather face: a) on a press, b) on roller [10]



Figure 2. Different patterns of embossed leather [11]

The embossing can be done on the grain side as well as on the flesh side of the leather. In both cases, the structure of the unembossed leather remains curved and a three-dimensional effect is achieved [7]. The addition of colors during the embossing process leaves pigmented patterns on the leather and is referred to as color embossing. Color embossing is a preferred method for complex designs [12]. The manual technique for embossing leather is called stamping, using metal stamps and some other tools. This method of leather production requires some expertise. The embossing process with stamping is more suitable for unfinished vegetable tanned leather as it is more receptive to pressure than finished leather [12, 13].

### 2.2. Leather carving

Embossing, in which the outline of the image is first cut to a certain depth with a special rotary knife (swivel knife), is known as carving. Carving is a traditional method of leather processing and is used to apply decorations. Thicker, vegetable-tanned leather without any finishing is best suited for carving. Such leather has the necessary stability for processing and brings out the motifs much better. The motifs are applied firmly to the leather with a hammer. To do this, the leather is first moistened with a sponge or cloth. The process is repeated until the desired pattern is finished. Due to the wetting, the leather fibers to swell and become easily malleable and they remain stable even after drying. Basically, this work is very simple. But as with all arts, there are people who have a talent for "painting" motifs on leather. For further decoration after carving, the leather can be dyed with intense colors, decorated with gold leaf or painted with transparent leather paints. Leather used for saddles, belts or bags is more heavily carved. This decoration technique was most popular in Europe in the Middle Ages. It was replaced by the emergence of more modern methods of leather decoration [7].

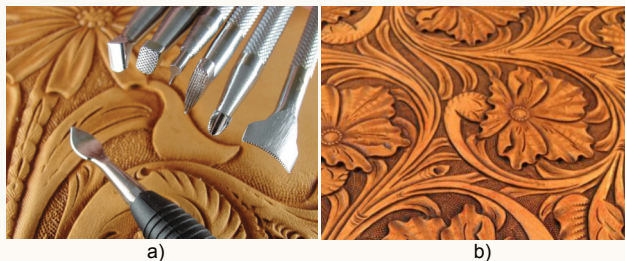


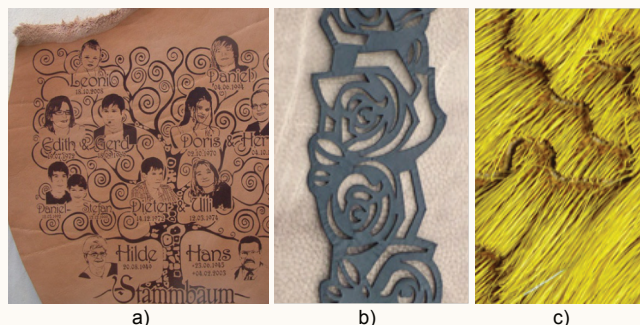
Figure 3. a) Leather carving tools, b) Carved leather [14, 15]

### 2.3. Laser engraving and cutting

With today's technology, image files can be burned into leather with a laser. The process of engraving or etching leather creates an embossed effect and, depending on the surface of the leather, produces a striking and clean contrast. The upper layers of the leather are burned in. On light-colored leathers, a clear color contrast is created, while engraving on darker leathers creates a more subtle contrast. This process does not cause any damage, but the natural color of the leather changes. Lasers can also be used on pigmented leather. In this case, only the top layer of color is burned in. If the surface treated with a laser is to be painted, a film is applied to the leather. The film burns in according to the desired



pattern, the "indentations" created by the laser are colored and then the entire film layer is removed. In this way, it is possible to paint the indentations without painting the surface. The results of the engraving depend mainly on the speed, power and frequency of the laser and the type of leather. The laser can be used to cut leather of different thicknesses. Interesting patterns can also be produced in this way. Of course, in this case, the laser passes through the entire cross-section of the leather and produces tight cuts that do not fray or otherwise become damaged. Special laser effects can also be achieved by cutting the leather hair [16, 17].



**Figure 4.** Laser-treated leather a) burnt surface, b) cut leather hair of leather c) cut leather hair [18]

## 2.4. Leather embroidery

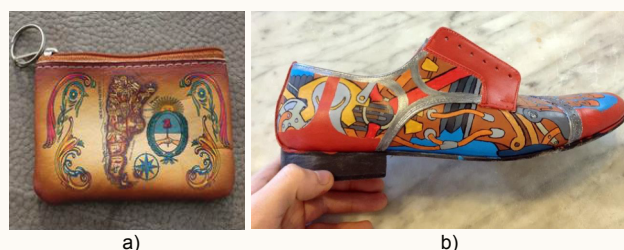
Leather that is decorated with attractive thread work is called leather embroidery. In embroidery, beautiful designs are applied to leather surfaces using embroidery machines or hand embroidery techniques. The design is applied to the leather using drawing machines or by hand. Choosing the right leather and thread is crucial in this process. The leather must be strong enough to withstand the penetration of the needle and the thread must be strong and fine to create precise patterns. The most commonly used leathers for embroidery are those with a durable structure and flexibility and an acceptable thickness (sheepskin, goatskin, cowhide and deerskin). The embroidery process is the same for all types of leather, and the types of needles, threads, stabilizers and twisting techniques can be adapted according to the characteristics of the leather. Although the purpose of embroidery is decoration, the thread used must match the leather in terms of durability and thickness. Depending on the complexity of the embroidery motif and the type of leather, the thread thickness is adjusted. The leather can be additionally stabilized by placing the material on the fleshy side of the leather. This prevents stretching and creates a more visible and attractive design. Leather embroidery machines can be industrial embroidery machines (which can embroider several designs at the same time) or single-head embroidery machines (which embroider a single design). Embroidery decorations on leather became a popular and important design element in the 18th and 19th centuries. The techniques and motifs have constantly evolved. Modern embroidery techniques allow for a variety of styles and effects. From hand-embroidered traditional motifs to machine-produced designs with computerized patterns - there are no limits to creativity. Embroidery on leather remains a timeless art form, reflecting the history and culture of different eras while still leaving room for artistic innovation. Today, leather is available with a variety of embroideries, whether for promotional elements, computerized patterns or unique, handcrafted designs. Embroidery on leather allows the addition of an artistic component and gives it a timeless form [19, 20].



**Figure 5.** Embroidery on leather belt [22]

## 2.5. Printed and painted leather

The process of producing a variety of textures and effects on the surface of leather is known as leather printing. The most commonly printed leathers are used for the production of bags and wallets. It is possible to create a wide range of effects and textures on accessories. Printing can be done using screen printing or inkjet printing (analogous to the inkjet process in commercially available PC printers). With an ink specially developed for leather, it is possible to apply high-quality, multi-colored motifs. The leather must not have any release agents on the surface, as these reduce the adhesion of the ink. In the screen printing process, a stencil (screen) of the motif is printed onto a fine mesh, which is best suited for simple and bold motifs and allows for a wide range of colors and effects. A special ink is then pressed through the screen and transfers the design onto the leather. Digital printers equipped with special inks can print detailed and colorful designs directly onto leather. This method allows for photorealistic images and intricate patterns, making it a popular choice for fashion accessories, upholstery and leather artwork. Thermal transfer printing involves printing a design onto transfer paper using an inkjet printer. The printed design is then transferred to the leather using heat and pressure through a heat press. This technique is ideal for printing on leather with textured surfaces or uneven areas. The base tone of the leather to be printed should be white or at least very light so as not to distort the color character of the motif. The colors are mixed from the basic tones magenta, cyan and yellow as well as a black component (subtractive color mixing). White printing is not technically possible, which means that dark leather surfaces are not suitable for printing [22, 23]. The term "varnishing" refers specifically to the application of color pigments to the surface of leather. Painting involves the color pigment is applied locally. In painting, a leather worker brushes a thin layer of color onto the surface of the leather. Painting leather is a fascinating art that combines creativity and craftsmanship to create beautiful and unique designs on this luxurious material. Both when painting and printing patterns on the leather, it is important to prepare the surface of the leather in addition to the appropriate color, which must be clean and free of grease or additives that prevent the color from adhering to the leather surface [7].



**Figure 6.** a) Printed leather key bag, b) Painted leather shoe [23, 24]

## 2.6. Foil stamping

Foil stamping is often used to finish leather products such as luxury handbags, magazines and high-end accessories. Different types of foils can be applied to the surface of the leather so that the entire surface of the desired pattern is covered. They are applied with a press under pressure and at a certain temperature. The parameters depend on the type of film and the substrate, i.e. the leather. They can be applied to the front of the leather or to the split. As with the current method, they give the leather a specific appearance and design [25]. Foil stamping adds a touch of elegance and opulence to leather goods.



**Figure 7.** Foil with metallic effect for leather stamping [25]

### 3. Conclusion

Leather treatments such as tattooing and decorating with burning, gluing cut leather are a continuation of the mentioned examples of decoration. Technological progress has brought and brings new possibilities of decoration that can be applied to the leather due to its characteristic collagen structure, which provides the necessary physical and mechanical resistance and enables the listed treatments. After applying the mentioned methods of decoration, the leather still has all the necessary properties to produce a full-value and durable article. Leather embossing, laser engraving and cutting, embroidering, leather printing are methods that are used in the mass production of leather, but with unique patterns and an artistic approach, it is possible to get a high-fashion item with added value. Manual decoration procedures are special and different in themselves, because in most cases they depend on the wishes of individual customers and on the artistic abilities of the craftsman himself. Leather decoration is a fascinating art that combines creativity with artisanship to create beautiful and unique designs on this luxurious material. From bold screen prints to intricate embossing, various techniques allow artists, designers and craftspeople to breathe life into leather and create bespoke pieces that stand the test of time. The smooth surface of the leather is like unpainted paper and can be seen as a canvas for decoration. The methods mentioned above and the structure of the leather itself make this possible [7, 20].

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