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# THE INFLUENCE OF FATLIOURING PROCESS ON GARMENT LEATHER DRAPEABILITY

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***Abstract:*** *Fatliquoring process is of importance due to the impact on the comfort and mechanical properties of the leathers. In this process, leathers are lubricated to minimize the fibre friction, to ensure the comfort properties like softness, drapeability and flexibility, to provide the required mechanical and touch properties. And the comfort of a leather product is explained as the satisfaction of a person in the wear material. Thus the fatliqouring process, the types and the proportion of fatliqours used in the process become the main focus in terms of drape behaoivors and physical characteristics of the leathers. For this purpose, the effect of fatliqouring process on the drapeability behaiovurs of the garment leathers was aimed to investigate. In the study, fifteen wet-blue leathers and the mixture of synthetic, sulphited and sulphonated fatliqouring agents were used for the garment leather production. The leathers were treated with the fatliqouring agents in five different proportions such as 4, 6, 8, 10 and 12%. Subsequent to mechanical operations, crust leathers were evaluated in accordance with the standards of TS ISO 3801 - Determination of mass per unit length and mass per unit area, TS EN ISO 2589 - Determination of thickness, TS 9693 - The Assessment of Drape of Fabrics, TS 1409 - Stiffness Determination of Woven Textiles and ASTM D1388 - Standard test method for stiffness of fabrics. As a result of the study, it was revealed that the increase in the amount of fatliqours led the enhanced drapeability characteristics of the garment leathers.*

***Key words:*** *Fatliqouring, leather, softness, drapeability, bending rigidity, stiffness*

## 1. INTRODUCTION

Leathers are produced by a series of chemical and mechanical operations and fatliquoring is one of the important processes due to the influence on the physical characteristics of the leather products [1,2]. The products used in fatliqouring applications provide the comfort and mechanical properties that helps to convert the crust leathers into high-performance leather goods [3,4]. By fatliqouring applications, minimization of the fibre friction, ensurance of wear comfort properties as well as mechanical and touch properties will be performed [5,6].

Leathers used for garment leathers need to be fulfilled the required comfort and physical properties such as softness, drape, water vapor permeability and so on [2,7]. Drape is known as the deformation of a fabric produced by its own weight and is of importance for garment aesthetics [2,8] and the stiffness is the parameter to assess the bending rigidity and handling of the material [9].

Although there are some studies in literatures about fabric drapeability and stiffness, according to our knowledge, there is not any study describing the effect of fatliqouring applications on the drabeability characteristics of garment leathers.

For this purpose, to determine the effect of the fatliqouring process on the drapeability behaivours of the garment leathers in terms of drapeability, bending rigidity and stiffness properties were aimed to determine. Therefore, fifteen metis type wet-blue leathers were used for the fatliqouring process. The mixture of synthetic, sulphited and sulphonated lubricating agents were used in the proportions of 4, 6, 8, 10 and 12% for triplicate experiments to determine and compare the drapeability characteristics of the garment leathers.

## 2. MATERIAL AND METHOD

### 2.1 Material

In the study, fifteen wet-blue leathers were used for the fatliquoring process. The metis type chromium tanned leathers were obtained from Akaylar Leather Company (Izmir, Turkey). Three different types of fatliqour agent (mixture of synthetic, sulphited and sulphonated fatliqours) commonly used for the garment leather production were selected for the fatliqouring applications.

### 2.2 Methods

Metis type wet blue leathers were washed and retanned with 4% chromium syntan. After the neutralization process at pH 5.5, the leathers were subjected to retanning and fatliqouring process. First, the leathers were treated with resin and phenolic based syntan in the proportion of 3%. Later, the leathers were fatliqouried with the mixture of synthetic, sulphited and sulphonated fatliqour agents in the amount of 4, 6, 8, 10 and 12% based on the leather weight. After washing, drying and mechanical operations, the drapeability behaivours of the garment leathers were determined by the measurement of thickness, grammage, drape-ability, bending rigidity and stiffness properties of the leather samples.

Sampling of the crust leathers was performed according to TS EN ISO 2418 standard [10] and the samples were conditioned in accordance with TS EN ISO 2419, at 23±2°C and 50%±5 relative humidity [11].

The thickness and grammage of the samples were measured according to TS EN ISO 2589 and TS ISO 3801 standards respectively [12,13].

Drape coefficient was determined using drape tester according to TS 9693 [14]. The drape coefficient was expressed as a percentage. A circular leather specimen of 30cm diameter was placed between two horizontal discs (18cm), and the unsupported annulus of leather was allowed to hang down. The photos of the draped specimens were taken by a camera and the pixels of the photos were counted. The drape coefficient was calculated with the formula Eq. (1) as given below:

$$\textit{Drape coefficient (DC \%)} = [(M - S) / (L - S)] \times 100 \quad \textbf{(1)}$$

M: Material Pixels Count, S: Small Diameter Pixels Count, L: Large Diameter Pixels Count

Stiffness test was performed using digital pneumatic stiffness tester according to ASTM D1388 [15]. The bending stiffness of the garment leathers were tested by the standart of TS 1409 [16]. Bending stiffness, G was calculated according to the following equation:

$$G = 0.1.M.C^{3} \text{ (mg.cm)} \quad \textbf{(2)}$$

where: M - fabric weight ($g/m^2$)

C - bending length mean value in warp and weft direction (cm)

$$G = \sqrt{G_{warp}.G_{weft}} \quad \textbf{(3)}$$

All the experiments were performed in triplicates and the results were given as mean values.

## 3. RESULTS AND DISCUSSION

### 3.1. Mass per unit area and thickness values of the garment leathers

Mass per unit area and thickness values of the garment leathers fatliqoured in different proportions such as 4, 6, 8, 10 and 12% are given in Table 1. The thickness values of the garment leathers were found similar due to the shaving process as generally the requested final thickness values of the garment leathers were 1mm.

The mass per unit area values of the leathers showed a direct proportion to the increased fatliqour amounts. Comparable grammage values were obtained from the leathers fatliqoured with the amount of 6% and 8% and the effect of the fatliqouring proportion on the mass per unit area values of the crust garment leathers were found significant.

***Table 1:*** *Mass per unit area and thickness values of the garment leathers fatliqoured in different amounts*

| | **4%** | **6%** | **8%** | **10%** | **12%** |
|---|---|---|---|---|---|
| Thickness (mm) | 0.95±0.07 | 1.03±0.12 | 0.99±0.05 | 1.10±0.04 | 1.01±0.10 |
| Grammage (g/m$^2$) | 453.59±34.91 | 523.68±34.37 | 530.19±10.54 | 554.69±9.82 | 612.44±46.64 |

### 3.2. Drapeability behaivours of the garment leathers

The drapeability characteristics of the garment leathers in terms of drapeability coefficient, stiffness and bending rigidity are shown in Table 2. It is revealed that the fatliqouring process performed in five different proportions was found effective on the drapeability behaivours of the garment leathers. Drape coefficients, stiffness and bending rigidity values of the leathers were decreased in accordance with the increased amount of fatliqouring agents. The higher amounts of fatliqours led to an increase on the softness and drapeability properties of the leathers. Considering the drapeability coefficient, the amounts of 10 and 12% of fatliqours resulted similar values, although a slight difference were observed from their stiffness and bending rigidity values of the leathers. This is attributed to their increased softness properties of the leathers but from the environmental and economic point of view, there seems to be no need to use the mixture of fatliqouring agents above 10%.

***Table 2:*** *The drapeability characteristics of the garment leathers fatliqoured in different amounts*

| **Ratio** | **Drapeability coefficient** | **Stiffness (N)** | **Bending Rigidity (mg.cm)** |
|---|---|---|---|
| 4% | 50.62 | 22.6 | 8059.35 |
| 6% | 48.89 | 21.3 | 8087.46 |
| 8% | 43.54 | 16.5 | 7935.68 |
| 10% | 40.26 | 15.7 | 7813.97 |
| 12% | 40.16 | 13.5 | 7427.94 |

## 4. CONCLUSIONS

In the study, the effect of the fatliqouring process on the drabeability behaviours of the garment leathers were aimed to determine. For this purpose, metis type wet blue leathers were treated with five different amounts of fatliqour mixture consisting of synthetic, sulphited and sulphonated lubricating agents' mixture in the proportions of 4, 6, 8, 10 and 12%. The change occurred due to the increasing amount of lubricating agents were presented as mass per unit area, thickness, drapeability, bending rigidity and stiffness values and the following conclusions have been drawn;

1. The grammage values of the garment leathers were found in direct proportion with the usage amount of fatliqouring agents.
2. Drapeability coefficient, stiffness and bending rigidity values were decreased by the increase of the fatliqours amount.
3. Thus, the increase in the amount of fatliqours led to an increase in the softness and drapeability properties of the garment leathers. Consequently, it was revealed that fatliqouring process had an impact role on the drapeability behaivours of the garment leathers.

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