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## **STUDY PERFORMANCE OF NEW UPHOLSTERY MATERIALS FOR UPHOLSTERED FURNITURE**

**Abstract.** *The article deals with the experimental study of the technical characteristics of the new upholstery fabrics for upholstered furniture. As well as the basic methods of tissue tests, equipment and materials used for the study. The aim of the article is to study the technical characteristics of new upholstery materials for the production of upholstered furniture and the prediction of their durability. On the basis of the study found that flock tissue is more resistant to abrasion than chenille fabric and is recommended for the office and public furniture production. The results obtained allow to predict the life of upholstery fabric and choose for specific conditions and the most suitable type of tissue.*

**Keywords:** *furniture, material, upholstery fabric, chenille, flock.*

### **Introduction**

In the book, G.I. Klyuev "Technology of production of furniture" [1] describes the classification of upholstery fabrics, describes the types of upholstery fabrics and their properties, mainly of such tissues as the jacquard, greatcoat, flock, velour. But the author does not recommend specific to the wide application of any of the tissue and, accordingly, does not mark their advantages and disadvantages to each other.

In this thesis, A.V. Korobtsova on the theme: "Development of a method of designing of jacquard Furniture decorative fabrics" [2] used computer-aided design method, a single-layer jacquard fabric for a given tearing apart the fabric load, as well as the proposed formula for calculating, on the basis of tissue density and weft based on mutual location of main and weft yarns.

The thesis EA Malyavko "Evaluation of durability and prediction of upholstery fabrics quality indicators" [3] analyzed the quality upholstery fabrics. For the purpose of furniture fabrics is particularly important is the reliability of the product in use, so to solve this problem in this thesis examined the behavior of the materials in the process of wear and tear. Investigations and derived mathematical relationships change a number of mechanical properties (tensile and tearing apart the load, elongation at break) and physical properties (air, water and oil permeability, water and oil resistant) on the amount of abrasive influences.

In [3] also developed a method for predicting the mechanical properties of furniture fabrics in view of operating conditions on the basis of three-dimensional spline method. Development of a method of complex evaluation of mechanical and physical properties of the upholstery fabrics.

The main cause damage to tissues and its withdrawal from service is abrasion due to wear of the most loaded areas of upholstered furniture. There are concepts of wear resistance of fabrics and their abrasion resistance. The wear resistance of the fabric – is its ability to withstand the combined action of abrasion and bending, and abrasion resistance – a fabric's ability to resist abrasion due to rubbing of external influences. The dominant feature in the present fabric is abrasion resistance.

The methodology of this research includes theoretical and experimental research. Experiments were carried out using standard methods in the laboratory. For the processing of the experimental results in the studies used numerical methods of applied mathematics, mathematical statistics, and tests were conducted for wear. There are several ways to carry out the attrition test. The most common is the Martindale test. The principle of the test is as follows: the test piece is fixed on a smooth fabric surface foam. Abrasive (rubbing material) is felt, attached to the metal disk. The disc begins with a third abrasive cloth in a circular motion with little effort. One circular motion corresponds to one cycle.

### **Materials and Methods**

Tests carried out on the smooth tissue until three cut strands, but the pile – to full wear lint-based fabric.

As a result, each sample is assigned to measure tissue Martindale, i.e. the number (rate) of abrasion [4, 5]. The higher the ratio, the better the longer the fabric will last. Different fabrics, depending on the raw material composition and its type have a different threshold of attrition. Thus, viscose chenille withstand an average of 6,000 to 10,000 cycles on Martindale test, while a polyester velour withstands 50,000 cycles. When the number of abrasion cycles over 20 000 fabric is considered reliable.

Tests on tissue abrasion were carried out in the laboratory at the Department of SDM Trace in Tomsk. In use the machine grinding and polishing of thin sections for duplex 3E881 (Ukraine) as an experimental setup. General view it is presented in Figure 1.



Figure 1 – General view of the grinding and polishing machine

For the test were taken pieces of cloth from the flock and chenille. Tissue samples are presented in Fig. 2. (a) flock fiber, (b) chenille fabric [6,7]

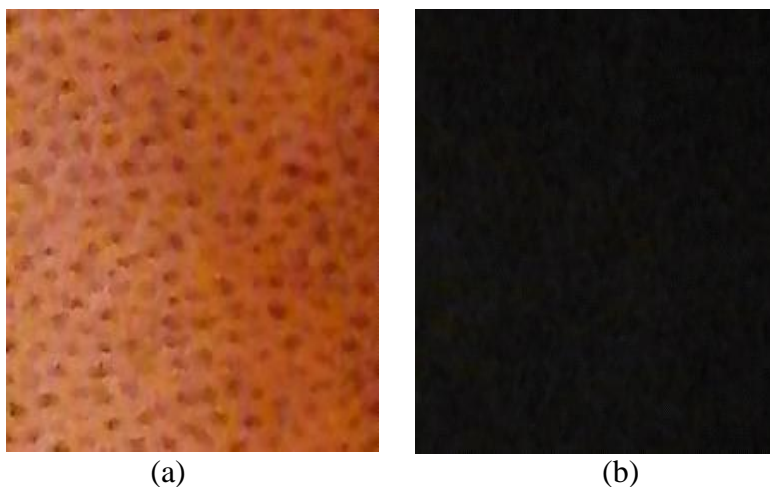


Figure 2 – Fabric samples: (a) flock fiber, (b) chenille fabric

Specifications flock fabric [8] brand Dream Puma375

- Tissue density of  $410\text{g/m}^2$
- Abrasion resistance:  $> 15,000$  cycles
- Fabric composition: polyester – 27%, polyamide – 34%, Acrylic – 39%.
- Country of origin – Turkey.

Specifications 29 chenille brand fabric [9].

- Density of the fabric  $373\text{g/m}^2$ .
- Abrasion resistance: 8000 cycles.
- Fabric: Polyester – 100%.
- Country of origin – Turkey.

Experiments on tissue abrasion carried out on the basis of the classical single-factor. The amount of abrasion cycles was taken as a variable factor. The permanent factors have been taken: the spindle speed polishing machine, pressure on the tissue, the temperature and humidity in the room. The weight of the samples to mechanical wear was adopted as an output parameter. Methodical mesh experiments presented in Table 1 and 2.

Abradable samples of fabric cutting flock and chenille 50x50 mm, glued on a wooden base with the same size and were tested for wear on the grinding machine 3E881. As the adhesive used universal glue mark "Superglue". As the foundations of abrasive grinding on Copy Machines 3E881 used felts. The samples were loaded on 6000 cycles of abrasion cycles with an intensity of 600 min<sup>-1</sup> for 10 minutes.

## Results and Discussion

Results of experiments on the implementation of abrasion upholstery materials for the production of upholstered furniture were carried out on the example of tissue samples from the flock and chenille in accordance with the methodological grids presented in Table 1 and 2.

Table 1 – Results of experiments on the implementation of attrition for the flock

Factor name	Number pp				
	1	2	3	4	5
the number of cycles, units.	0	6000	12000	18000	24000
abrade the mass of samples	1,5/0	1,4/0,1	1,3/0,2	1,2/0,3	1,1/0,4

Table 2 – Results of experiments on the implementation of attrition for the chenille

Factor name	Number pp				
	1	2	3	4	5
the number of cycles, units.	0	6000	12000	18000	24000
abrade the mass of samples	1,65/0	1,85/0,15	1,5/0,3	1,35/0,45	1,2/0,6

As can be seen from Fig. 3 (a,b) and 4 (a,b) abradable samples not only lose weight but also color.

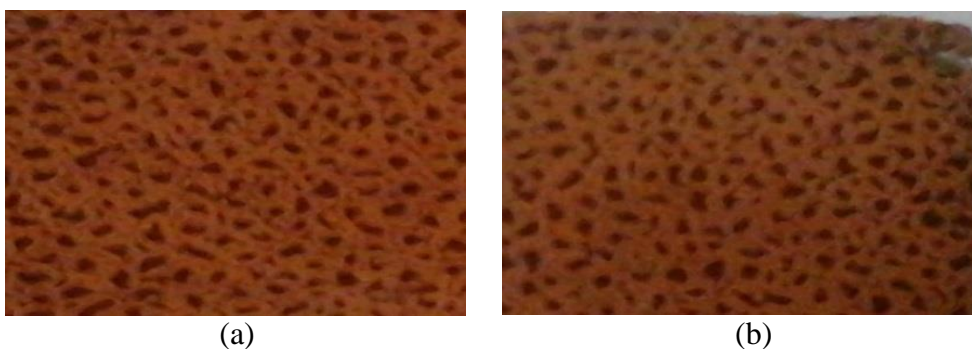
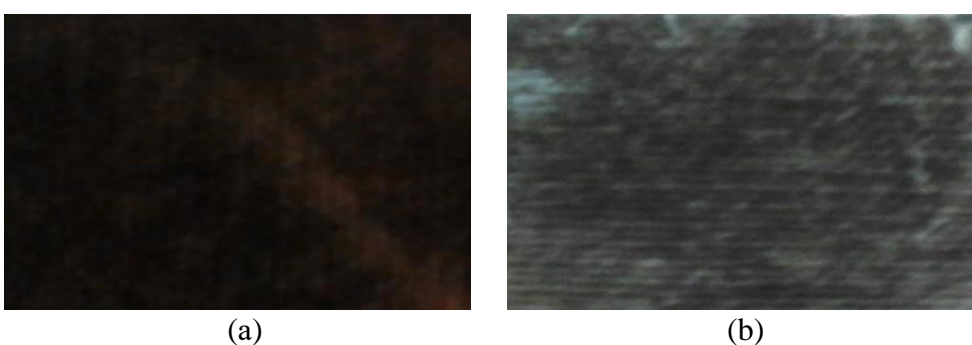


Figure 3 – General view of the flock fabric (a) before and (b) after the test



Picture 4 – General view of the chenille fabric (a) before and (b) after the test

## Conclusion

Analysis of the results of experimental studies of the technical characteristics of the upholstery flock and chenille shows that an increase in the number of abrasion cycles is almost directly proportional to the mass loss of specimens. The approximat-

ing function is normal, logarithmic and not contrary to the laws and universally recognized previously in similar studies. Thus it is possible to make an assumption that the weight loss of test materials correlation samples associated with a loss of strength, since the moment of inertia of the cross-sectional samples will decrease in direct proportion to weight loss.

Also, the analysis of experimental results, it follows that the greater resistance to abrasion has flock fabrics. It has at the same conditions, compared to chenille, the abrasion resistance above 1.5 times (0.75/0.5), i.e. losing weight chenille abrasion 1.5 times faster than the flock.

Flock fabric has a higher abrasion resistance as compared to chenille, so it can be recommended for conditions where the daily exposure to the fabric (the number of cycles in the unit load) is more intense (30-50 or more cycles). This is typical for office and public furniture. For less loaded furniture with the number of cycles of exposure to the loading unit 10-30 can be recommended chenille tissue. It is common for household furniture.

#### **References:**

1. *Klyuev G.I. Furniture production technology. – M: Academy, 2010, P.350.*
2. *Korobtsova AV. Development of a method of designing of jacquard Furniture fabrics decorative. – St.Petersburg, 2011, P.35.*
3. *Malyavko E.A. Evaluation of wear resistance and forecasting of indicators of quality upholstery fabrics. – Moscow, 2012, P.42.*
4. *GOST R ISO 12947-1-2011 Textile materials. Determination of abrasion resistance of canvases by the Martindale method. Part 1. Martindale Abrasion Test Device.*
5. *GOST 9913-90 Textiles. Methods for determination of resistance to abrasion.*
6. *Olejnik S. Decorative upholstery fabrics: forming assortment. Herald of KN, 2011, №2, P.89-91.*
7. *GOST 29298-2015 Cotton and mixed household fabrics. General technical conditions.*
8. *Olejnik G.S. Shinillovye furniture fabrics: a study of color lightfastness. - Khmelnytsky National University, 2011, №3, P.137-141.*
9. *Kuandykova G.ZH., Kurmanbekova E.B., Shilko V.K. Analysis of indicators of quality tissue shenillovyyh, Modern Science of the XXI century. – Tomba, №6 part, 2014, P. 65-68.*

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### **ЖҰМСАҚ ЖИҢАЗҒА АРНАЛҒАН ЖАҢА ҚАПТАУ МАТЕРИАЛДАРЫНЫҢ ТИІМДІЛІГІН ЗЕРТТЕУ**

**Аңдатпа.** Мақалада жұмсақ жиһазға арналған жаңа қаптау маталарының техни-

калық сипаттамаларын эксперименталды түрде зерттелгені қарастырылған. Сондай-ақ сынақтардың негізгі әдістері, зерттеу үшін қолданылатын жабдықтар мен материалдар көрсетілген. Мақаланың мақсаты — жұмсақ жиһаз өндіруге арналған жаңа қаптау материалдарының техникалық сипаттамаларын зерттеу және олардың төзімділігін болжау. Зерттеу негізінде флок қаптау материалы шенилл қаптау материалына қарағанда тозуға төзімді екендігі анықталды және кеңсе мен қоғамдық жиһаз жасау үшін ұсынылады. Нәтижелер қаптау материалдарының қызмет ету мерзімін болжауға және белгілі бір жағдайлар үшін ең қолайлы түрін таңдауға мүмкіндік береді.

**Түйін сөздер:** жиһаз, материал, қаптау матасы, шенилл, флок.

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## **ИССЛЕДОВАНИЕ ЭФФЕКТИВНОСТИ НОВЫХ ОБИВОЧНЫХ МАТЕРИАЛОВ ДЛЯ МЯГКОЙ МЕБЕЛИ**

**Аннотация.** *Статья посвящена экспериментальному изучению технических характеристик новых обивочных тканей для мягкой мебели. А также основные методы исследования тканей, оборудования и материалы, используемые для исследования. Цель статьи - исследование технических характеристик новых обивочных материалов для производства мягкой мебели и прогнозирование их долговечности. На основании проведенных исследований установлено, что ткань флок более устойчива к истиранию, чем ткань шенилл и рекомендована для производства офисной и общественной мебели. Полученные результаты позволяют прогнозировать срок службы обивочной ткани и выбрать для конкретных условий наиболее подходящий тип ткани.*

**Ключевые слова:** мебель, материал, обивочная ткань, шенилл, флок.