Как видно из данных таблицы 3, показатели обработанных тканей по сравнению с показателями необработанных образцов повышаются. Коэффициент устойчивости к микробиологическому разрушению у обработанных текстильных материалов во всех случаях составил выше 80%. Значения разрывной нагрузки ткани после модифицирования золь-гель составами увеличиваются до 249 Н, в отличие от необработанной ткани, у которой данный коэффициент составил 168 Н. В отдельных примерах наблюдается некоторое снижение значения разрывной нагрузки, это возможно связано с совокупным влиянием таких факторов, как температура и длительность обработки, концентрация веществ в композиции.

Выводы

1. Повышение интенсивности окраски достигается при использовании ацетата цинка и силиката натрия высоких концентраций. Наибольшие показатели функции K/S наблюдаются при концентрациях силиката натрия 60-80 г/л.

2. Визуальный анализ окрашенных образцов показал, что среда крашения влияет на окраску. При переходе от нейтральной к кислой среде красильной ванны, цвет образца меняется, становится «глубже», насыщеннее, темнее.

3. Коэффициент устойчивости к микробиологическому разрушению у модифицированных текстильных материалов во всех случаях выше 80 %, по сравнению с необработанным образцом у которого данный коэффициент составил 63%.

СПИСОК ЛИТЕРАТУРЫ

1. Фомченкова Л. Современные текстильные материалы для рабочей специальной одежды // ЛегПромБизнес. «Рабочая одежда». - 2014. - №3. – С. 14-20.

2. Меленчук Е.В. Совершенствование технологий колорирования и отделки текстильных материалов с использованием новых отечественных полимеров: дис. ... канд.техн.наук: 05.19.02. - ФГБОУ ВО Ивановский государственный химико-технологический университет, 2016 – 165 с. – Инв. № № 762901.

3. Schramm C., Rinderer B. Dyeing and DP treatment of sol-gel pre-treated cotton fabrics// Fibers and polymers, 2011, Vol.12, No.2. - P. 226-232.

4. Ізбергенова М.М., Дюсенбиева К.Ж. Совершенствование технологии колорирования текстильных материалов с использованием золь-гель метода. /Международная научная студенческая конференция «Инновационное развитие легкой и текстильной промышленности» (ИНТЕКС-2018) 17-19 апреля 2018 - С.151-152.

5. Конькова Т.В., Гордиенко М. Г., Алехина М. Б., Меньшутина Н. В. Синтез силикагелей с контролируемой пористой структурой // Журнал неорганической химии. – 2014. - том 59, № 11. - С. 1457-1461.

6. Пехташева Е.Л., Неверов А.Н., Заиков Г.Е., Шевцова С.А. Биоповреждения хлопковых волокон // Вестник Казанского технологического университета. – 2012. – Т. 15, № 8. - С.173-177.

UDC 677:687.17
IRSTI 64.33.81

STUDY OF NOISE PROTECTION PROPERTIES OF MATERIALS AND CLOTHES PACKAGES

ZH. USENBEKOV[1], B.H SEITOV[1], S.K. NURBAY[1], K. ERBOL[1]

([1]Almaty technological university, Kazakhstan, Almaty)
E-mail: zh.usenbekov@mail.ru

The work is devoted to the study of the noise-protective ability of textile materials used for special clothing. An installation has been developed that allows measuring the noise level passing through the materials. Depending on the number of layers of materials, comparative evaluations of noise-protective capacity are determined. The research method allows to reasonably choose materials of special clothes for those working in noise-polluted conditions.

Key words: noise, material properties, sound meter, acoustic parameters of noise, noise protection suit.

КИІМ МАТЕРИАЛДАРЫ МЕН ПАКЕТТЕРІНІҢ ШУДАН ҚОРҒАУ ҚАСИЕТІН ЗЕРТТЕУ

Ж. УСЕНБЕКОВ[1], Б.Х. СЕИТОВ[1], С.К. НУРБАЙ[1], К. ЕРБОЛ[1]

([1]Алматы технологиялық университеті, Қазақстан, Алматы)
E-mail: zh.usenbekov@mail.ru

Жұмыс арнайы киімдергеде қолданылатын шуылдан қорғайтын арналған текстиль материалдарының шуылдан қорғау қасиетін зерттеуге арналған. Материалдардан өтетін шуылдың деңгейін өлшеуге арналған қондырғы жасалған. Материалдардың қабат санына байланысты шуылдан қорғаудың салыстырмалары мөлшері анықталғна зерттеу. Тәсіл шуылды жағдайда жұмыс жасайтындар үшін арнайы киім материалдарын таңдауға мүмкіндік береді.

Негізгі сөздер: шу, материалдар қасиеті, шуыл өлшегіш, шудың акустикалық параметрлері, шуылдан қорғайтын костюм.

ИССЛЕДОВАНИЕ ШУМОЗАЩИТНЫХ СВОЙСТВ МАТЕРИАЛОВ И ПАКЕТОВ ОДЕЖДЫ

Ж. УСЕНБЕКОВ[1], Б.Х. СЕИТОВ[1], С.К. НУРБАЙ[1], К. ЕРБОЛ[1]

([1]Алматинский технологический университет, Казахстан, Алматы)
E-mail: zh.usenbekov@mail.ru

Работа посвящена исследованию шумозащитных способностей текстильных материалов, применяемых для специальной одежды. Разработана установка, позволяющая замерить уровень шума, проходящий через пакет материалов. Определены, в зависимости от количества слоев материала, сравнительные оценки шумозащитной способности. Метод исследования позволяет обосновано выбрать материалы специальной одежды для работающих в шумозагрязненных условиях.

Ключевые слова: шум, свойства материалов, шумомер, акустические параметры шума, шумозащитный костюм.

Introduction

Industrial production noises in some cases have such a strong effect on the body that it affects not only the productivity of the worker, but ultimately his health. In many industries, the level of industrial noise exceeds the permissible values stipulated by sanitary standards, and the elimination of noise from its source is not always possible.

Therefore, the problem of protection from noise and noise pollution is acute for all spheres of human activity. Currently, in almost all industries there are jobs, where there is industrial noise, the level of which has a negative impact on the person and, as a result, on the efficiency of the production process.

The most adverse effect of the acoustic factor is observed in such industries as oil and gas, chemical, petrochemical, automotive, aerospace, woodworking, clothing industry and others.

One of the means of protecting the body from the harmful effects of industrial noise is the use of such materials in clothing items that can effectively reduce acoustic oscillations on the way to the human body. This is necessary, since at high noise levels not only the organs of hearing and the brain, but also the internal organs of the human body are endangered [1, 2]. Therefore, reducing the noise level in the industry helps to improve working conditions, increases efficiency, and has a positive effect on people's health.

Under these conditions, for the complex protection of a person, the most effective means is the joint use of existing personal protective equipment and a sound-proofing suit. In this case, the selection of materials with sound-reflecting and sound-absorbing properties is important. In this regard, a comparative analysis

of the acoustic properties of textile materials and packages of them is an important task.

Objects and research methods

The object of the study are samples of various textile materials and packages of them. Which in varying degrees, have soundproofing properties and reflecting the modern range of textile materials that are used in special clothes to protect against the harmful effects of noise on the human body.

In order to identify which materials are most suitable for solving a given research task, an analysis of their operational (hygienic, physicomechanical, etc.) properties was carried out. According to the results of the analysis, the following textile materials were selected as the study samples:

1. Jacket fabric Neptun (polyester 100%) with polyurethane coated fabric, applied on the inner side (wrong side) for waterproofing. Water resistant to 1000 millimeters of water column, in which the fabric does not get wet;

2. Denim (100% cotton);

3. Forvord 240 BO (cotton 35%, polyester 65%) with a water-repellent coating.

Samples of materials prepared samples of size 100 × 100mm, which are used to determine the acoustic parameters using a sound level meter.

Subject of research: the development of an experimental setup and method for the comparative assessment of noise-protective properties of materials and clothing packages

In order to evaluate the noise protection properties of clothing material packages, an installation for comparative measurement of the acoustic parameters of materials used in the manufacture of noise protection clothing has been developed and manufactured.

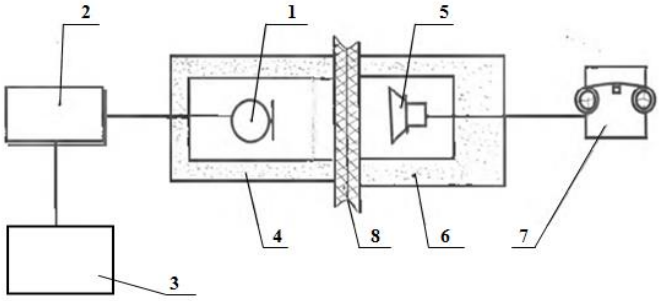

Figure 1 - Installation diagram (1 - microphone, 2 - sound level meter, 3 - high-speed recorder, 4 - microphone cylinder, 5 - loudspeaker, 6 - loudspeaker cylinder, 7 - tape recorder, 8 - test).

The installation consists of a low frequency signal generator, which is connected to a speaker and microphone. The latter are placed in soundproof insulated pipes. The microphone is connected to a sound level meter that measures the noise level. The tested package of materials (sample) is placed between the cylinders of the microphone and the speaker. The sound level meter is connected to the microphone and attached to the cylinder.

For a comparative assessment of the acoustic parameters of the sound level meter 2, the sound level emitted by the loudspeaker 5 without the test sample ($Ш_1$) was first measured. Then, between the cylinder of the speaker of the loudspeaker 6 and the cylinder of the microphone 4 was placed the test sample 8 or the package of materials and the sound level was measured under the same conditions ($Ш_2$).

The difference in noise levels (dB) measured by a sound level meter with and without a sample is the main acoustic criterion for evaluating the noise protection properties of the test sample, i.e. the amount of noise reduction (dB).

The installation diagram is shown in Fig. 1, and the appearance in Fig. 2, 3.

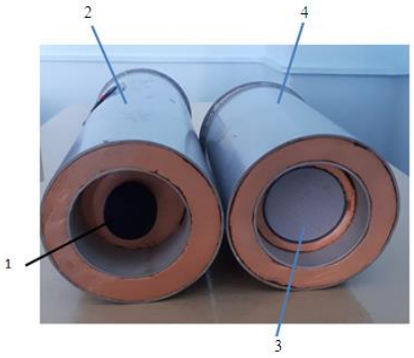

Figure 2 - Appearance of installation disassembled (1 - microphone, 2 - microphone cylinder, 3 - loudspeaker, 4 - cylinder of loudspeaker)

For a comparative assessment of the noise-insulating ability of the material, the coefficient of the noise reduction value (α) was determined:

$$\alpha=100*(Ш_1-Ш_2)/Ш_1,$$ where

$Ш_1$ - the amount of measurement of the sound level emitted by a loudspeaker without a test sample

$Ш_2$- the amount of measurement of the sound level emitted by the loudspeaker with the sample under study.

In order to reduce the error, the number of measurements for one sample was repeated at least five times. The advantage of multiple measurements is a significant reduction in the influence of random factors on the measurement error [3].

a b

Figure 3 - Installation appearance: sound level meter readings when measuring the signal without a sample (a) and with a breakdown (b).

Results and their discussion

It is important to analyze which properties of materials have a greater impact on the amount of noise reduction. Obviously, increasing the number of layers of material increases the amount of noise reduction. Therefore, it is of interest to solve the problem associated with identifying and justifying the dependence of the noise reduction value on the physicomechanical properties of the fibers, the structure of the material, its density and the number of layers.

Considering the complex nature of the movement of sound waves in a multi-layered sample (in particular, multiple reflection of sound from material layers), and the fact that sound passes through each subsequent layer with a lower volume, it can be assumed that the decrease in the noise level of each subsequent layer will be less than the previous (and not equal to him).

In order to verify the above assumptions, experimental studies were carried out to reveal the dependence of the amount of noise reduction on the number of layers of the same material in the sample. An experiment to determine the amount of noise reduction was carried out at a frequency of 100 Hz for materials: Neptun jacket fabric, denim, Forvord 240 BO. Studies were conducted for one, two, three and four

layers of material. The results of the study are presented in Figure 4.

According to the obtained experimental results, graphs of the dependence of the noise reduction value on the number of material layers were plotted. Analysis of which showed that the magnitude of noise reduction in the number of layers of material has a stepped character (that is $\alpha_1 > \alpha_2 > \alpha 3 > \alpha 4$). This dependence is due to the complex nature of the movement of sound waves in a multilayer sample.

This proves the absence of a directly proportional relationship between the amount of noise reduction and the number of layers in the sample (the contribution of each new layer to the total amount of noise reduction is less than the previous one), which must be considered when choosing the thickness and number of layers of materials in the package.

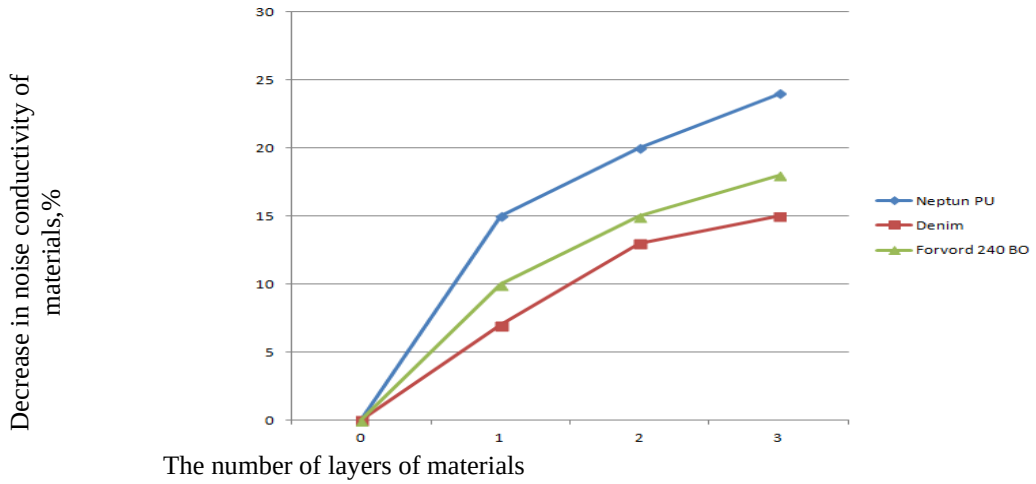

Figure 4 - Dependence of noise reduction on the number of layers of material (Neptun jacket fabric, denim, Forvord 240 BO)with a frequency of 100 dB.

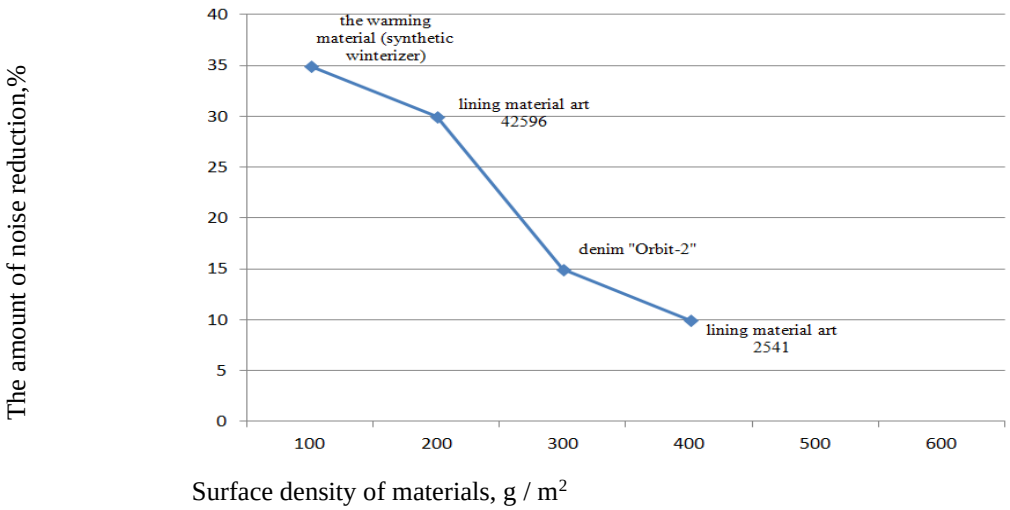

Figure 5 - Graph of the magnitude of the reduction in noise from the surface density

Conclusion

The results of the work performed:

• an experimental setup has been developed for comparative assessment of noise protection properties of materials and packages of them;

• criteria for evaluating noise protection properties of both individual materials and packages of them are selected;

• The noise protection properties of materials in a package of clothes with different surface densities were investigated.

REFERENCES

1. Dragan S.P. et al. Acoustic efficiency of noise protection // Medical equipment. 2013, No. 3. - P.34-36. (In Russian)

2. Dragan S.P. The method of calculating the integral assessment of the acoustic efficiency of personal protective equipment against noise // Life Safety. 2013, No. 2.- P.10-17. (In Russian)

3. Ponomarev, S.V., Shishkina, G.V., Mozgova, G.V. Metrology, standardization, certify-cation: a textbook for universities / - Tambov: Publishing House of the State Educational Institution of Higher Professional Education TSTU, 2010. – 96 p. (In Russian)

4. Osipov L.G., Bobylev V.N. Sound insu-lation and sound absorption: A textbook for uni-versity students enrolled in the specialty "Industrial and civilian construction" and "Heat and gas supply and ventilation" - Moscow: AST: Astrel, 2004. – 464 p. (In Russian)

5. GOST 16297-80. Sound insulation and sound absorbing materials. Measurement methods. Implemented from 01.01.81. - Moscow: State Standard of the USSR: Publishing house of stan-dards, 1988. – 12 p. (In Russian)

УДК 687.053.72.002.54
МРНТИ 64.01.85

КИНЕМАТИЧЕСКОЕ ИССЛЕДОВАНИЕ ТЕХНОЛОГИЧЕСКОЙ ВОЗМОЖНОСТИ ШВЕЙНОГО РОБОТА

С.Д. БАУБЕКОВ[1], К.С. ТАУКЕБАЕВА[2], У.К. ДЖАНАХМЕТОВ[3], М.Н. НЕМЕРЕБАЕВ[1], А. ЫНТЫКБАЙ[1]

([1]Таразский инновационно-гуманитарный университет Казахстан, Тараз, ([2]Филиал АО «Национальный центр повышения квалификации «ОРЛЕУ» «Институт повышения квалификации педагогических работников по Жамбылской области»Казахстан, Тараз) ([3]Казахский агротехнический университет им.С.Сейфуллина, Казахстан, Астана)
E-mail: oreke_55@mail.ru

Работа относится к машиностроению и посвящена автоматизации контурной обработки деталей изделия легкой промышленности. Предлагается новый способ контурной обработки деталей изделия легкой промышленности и устройство для его реализации, где без дополнительной переналадки конструкции машин можно выполнять контурные строчки различной кривизны, так как устройство самонастраивающееся, а контур является програм-мой для работы швейного робота РШ550. В работе приведены результаты кинематического исследования технологической возможности РШ550 и пути их расширения.

Ключевые слова: машиностроение, автоматизация контурных операции, легкая промышленность, эквидистантная строчки, кинематика процесса ориентаций, способ обработки, швейный робот.

ТІГІН РОБОТЫНЫҢ ТЕХНОЛОГИЯЛЫҚ МҮМКІНДІТЕРІН КИНЕМАТИКАЛЫҚ ЗЕРТТЕУ

С.Д. БАУБЕКОВ[1], К.С. ТАУКЕБАЕВА[2], У.К. ДЖАНАХМЕТОВ[3], М.Н. НЕМЕРЕБАЕВ[1], А. ЫНТЫКБАЙ[1]

([1]Тараз инновациялық-гуманитарлық университет, Қазақстан, Тараз) ([2]«ӨРЛЕУ» «Біліктілікті арттыру ұлттық орталығы» АҚ филиалы, «Жамбыл облысы бойынша педагогикалық қызметкерлердің біліктілігін арттыру институты», Қазақстан, Тараз,) ([3]С. Сейфуллин атындағы Казақ агротехникалық университеті, Қазақстан, Астана)
E-mail: oreke_55@mail.ru

Жұмыс машина жасауға қатысты және жеңіл өндірісінің бұйымдарын роботты жиекті өңдеуді автоматтандыруға арналған. Жаңа жиекті өңдеу әдісі мен оны орындайтын