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ATOMIC ABSORPTION DETERMINATION OF IRON AND MAGNESIUM IN PHARMACEUTICALS

Abstract: *The modern sample preparation of pharmaceuticals by decomposing an organic matrix by ultrasound and Triton X-100 was done. The influence of surfactant concentration and ultrasound treatment time on the sensitivity of Iron and Magnesium determination was studied. It was established that the most significant increase in the sensitivity of the atomic absorption determination of analytes was achieved at ω (Triton X-100) = 3% and ultrasound treatment time of 15 min.*

It was found out that the sensitivity enhancement for the determination of Magnesium increases by 1.5 and Iron by 1.8 times.

The content of Iron and Magnesium in such as medicaments "Analgin," "Caffeine," "Paracetamol" was determined by the atomic absorption method. The correctness of the results of atomic absorption determination of analytes by the "inserted-found" method was checked. It was shown that the systematic error is not significant. The detection limit of Iron ($C_{min} = 0{,}014 mg\ /\ l$) was estimated by the atomic absorption method. It appeared that limit is even lower than that presented in the literature data.

Key words: *Iron, Magnesium, atomic-absorption spectroscopy, sample preparation, ultrasound, Triton X-100, metrologic characteristics.*

Language: *English*

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Introduction

The pharmaceutical industry occupies one of the leading positions in the chemical industry of Ukraine. The pharmaceutical industry is developing rapidly. However, the public health issues, product quality, and the direct impact of pharmaceuticals on the body's vital functions are still poorly understood. The medical industry is characterized by a wide range of medicines. Among them, considerable attention is paid to those drugs that contain metals. The pharmacopoeial specifications require the definition of analytes in the structure of drugs. The pharmaceutical analysis includes control at all production stages: from the control of the raw materials to the standardization of the target products. This analysis creates an opportunity to study not only

individual medicaments but also mixtures containing many components. Pharmaceutical analysis has several areas depending on the analysis's objectives: pharmacopoeial analysis, dose formulation of particular drug components analysis, step-by-step control of drug production, rapid analysis in pharmacies, and biopharmaceutical analysis. For those issues, different physical, physicochemical, and biological methods are used. [1,p.24; 2,p.16; 3,p.11; 4,p.720; 5,p50; 6,p.39; 7,p.52; 8,p.38; 9,p.48; 10,p.5; 11,p.17; 12,p.9; 13,p.51; 14,p.55; 15,p.84]

Experimental

An atomic absorption spectrometer and CE333500 (flame version, hollow cathode lamps, acetylene-air flame) were used, Iron was determined at **λ** = 248.3 nm, and Magnesium at **λ** = 285.4 nm. The current used for both elements was I = 5mA, photoelectric pickup = 1.15 kV; the slit width of the monochromator was 0.1 nm. Laboratory weight scales ONAUS 64 (65 / 0.0001 g). Ultrasonic bath, model PS - 20, power - 120 W, frequency - 40 kHz. Triton X-100, $C_{14}H_{22}O$ $(C_2H_4O)_n$, where n = 9-10, Mr = 631 g/mol, CCM = $2.9 \cdot 10^{-4}$ mol/l. The initial concentration of metal solutions for the preparation of the calibration solutions is 0.1 g / l. The used distilled water and chemical reagents qualification not lower than analytically pure.

Results and discussions

We choose the surfactant concentration to increase the sensitivity of the atomic absorption determination of analytes.

As shown in Table 1, the most considerable value of the analytical signal was achieved at a concentration of Triton X-100 w = 5%.

As shown in Table 2, the most considerable value of the analytical signal was achieved at a concentration of Triton X-100 w = 5%.

As shown in Table 2.3, the most considerable value of the analytical signal was achieved at a concentration of Triton X-100 w = 5%.

As shown in Table 4, the most considerable value of the analytical signal was achieved by ultrasound treatment for 15 minutes

As shown in Table 5, the most considerable value of the analytical signal was achieved by ultrasound treatment for 15 minutes

As shown in Table 6, the most considerable value of the analytical signal was achieved by ultrasound treatment for 15 minutes

We constructed the dependence of the analytical signal of the analyte on its concentration. (Fig.1, 2)

The sensitivity factor is a numerical characteristic of sensitivity. If the graduated line is linear, then the sensitivity factor is defined as the tangent of the angle of inclination of the graduated curve. The sensitivity of the method is determined by the slope of the linear part of the graduated curve.

$$S = tg\alpha = \frac{dA}{dC} \quad (1)$$

$$\Delta S = \frac{tg\alpha_2}{tg\alpha_1}, \quad (2)$$

where

S - sensitivity,

ΔS – increasing of sensitivity,

$tg\alpha_1$ is the tangent of the angle of inclination of the graduated function of aqueous solutions,

$tg\ \alpha_2$ is the tangent of the angle of inclination of the graduated function with the modifier.

The value of the sensitivity coefficients according to formula 2.1. For Iron $\frac{tg\alpha_2}{tg\alpha_1}$ = 1.4, so the sensitivity increased by 1.2 times; for Magnesium $\frac{tg\alpha_2}{tg\alpha_1}$ = 1.5, so the sensitivity increased by 1.5 times.

The results of the atomic absorption determination of analytes by in samples of pharmaceutical substances

Firstly, the value of atomic absorption of samples should be determined. Next, the concentration of analytes g / l should be established from the graph. The following formula to calculate the concentration of metals in mg / kg is used:

$$C(mg/kg) = \frac{C(\frac{g}{l}) * V_f * 10^3}{m_{quant}}, \quad (3)$$

where

C $(\frac{g}{l})$ - the found concentration of the analyzed sample from the graduated graph,

V_f is the volume of the flask into which the sample was filtered,

m_{quant} - mass of the quantity of the sample.

Checking the correctness of the results of the atomic absorption determination of analytes by the "injected-found out"method.

The standard addition method is used in the analysis of samples with a complex chemical composition or in checking the correctness of the results of chemical analysis. The chemical and physical properties of the graduated solutions may differ from the properties of the samples that cause a systematic error.

Means of reducing the detection limit:

-usage of the maximum brightness of illumination of a source;

- the maximum possible width of a crack which does not lead to overlapping with other close lines;

-minimization of non-selective absorption;

-general optimization of the signal-to-noise ratio.

Multiple measurements of the absorption signal of the zero solution. Measures of 15-20 values of the digital recording device should be estimated, then the value of the standard deviation of the background by formula (4) should be calculated:

$$S_0 = \sqrt{\frac{\Sigma(\bar{A}-A)^2}{n-1}} \quad (4)$$

Calculation of the detection limit should be evaluated by the following formula (5):

$$C_{min} = \frac{3S_0}{S} \quad (5)$$

Thus, the obtained value of the detection limit of Iron is less than the one presented in the literature data.

Conclusions

1. The content of Iron and Magnesium in the substances of pharmaceuticals was determined by the atomic absorption method.
2. The influence of the concentration of Triton X-100 and ultrasonic treatment time on the signal value at atomic absorption determination of Iron and Magnesium were studied. It is shown that the maximum analytical signal for analytes is achieved by using Triton X-100 with a mass fraction of 5% and an ultrasonic treatment time of 15 minutes;
3. The most significant increase in sensitivity was determined at the addition of Triton X-100 (w = 5%), for Iron - 1.4 times, for Magnesium - 1.5 times.
4. The correctness of the results of atomic absorption determination of analytes by the "inserted-found" method was checked out. It is shown that the systematic error is not significant.
5. The limit of the detection of Iron (C_{min} = 0.014 mg / l) is lower than the one represented in the literature.

Table 1. Choice of concentration of Triton X-100 for increasing of the sensitivity of atomic absorption determination of Iron and Magnesium for the sample "Paracetamol" (n = 5, P = 0.95).

w(Triton X-100),%	C(Fe)mg/kg $C \pm \frac{t_p, S}{\sqrt{n}}$	S_r	C(Mg)mg/kg $C \pm \frac{t_p, S}{\sqrt{n}}$	S_r
0	106±1	0,01	859±11	0,01
3	127±2	0,01	3007±37	0,01
4	128±2	0,01	3283±41	0,01
5	149±2	0,01	3446±43	0,01
6	148±2	0,01	3444±43	0,01

Table 2. Selection of the concentration of Triton X-100 for increasing the sensitivity of the atomic absorption determination of Iron and Magnesium for the sample "caffeine" (n = 5, P = 0.95).

w(Triton X-100),%	C(Fe)mg/kg $C \pm \frac{t_p, S}{\sqrt{n}}$	S_r	C(Mg)mg/kg $C \pm \frac{t_p, S}{\sqrt{n}}$	S_r
0	56,7±0,7	0,01	656±8	0,01
3	67,5±0,8	0,01	2295±29	0,01
4	68,0±0,8	0,01	2495±31	0,01
5	79,4±0,9	0,01	2629±32	0,01
6	79,0±0,9	0,01	2627±33	0,01

Table 3. Selection of Triton X-100 concentration for increasing of the sensitivity of atomic absorption determination of Iron and Magnesium for the sample "Analgin" (n = 5, P = 0.95).

w(Triton X-100),%	C(Fe)mg/kg $C \pm \frac{t_p, S}{\sqrt{n}}$	S_r	C(Mg)mg/kg $C \pm \frac{t_p, S}{\sqrt{n}}$	S_r
0	61,1±0,8	0,01	1749±22	0,01
3	72,7±0,9	0,01	6121±76	0,01
4	73,3±0,9	0,01	6454±80	0,01
5	85,5±1,1	0,01	7013±87	0,01
6	85,3±1,1	0,01	7010±87	0,01

Table 4. Selection of ultrasound treatment time in the atomic absorption determination of iron and magnesium for the sample "paracetamol" (n = 5, P = 0.95).

US,min.	C(Fe)mg/kg $C \pm \frac{t_p, S}{\sqrt{n}}$	S_r	C(Mg)mg/kg $C \pm \frac{t_p, S}{\sqrt{n}}$	S_r
10	155±2	0,01	3470±43	0,01
15	159±2	0,01	3523±44	0,01
20	157±2	0,01	3508±44	0,01
25	155±2	0,01	3511±44	0,01
30	155±2	0,01	3518±44	0,01

Table 5. The choice of ultrasound treatment time in the atomic absorption determination of Iron and magnesium for the sample "caffeine" (n = 5, P = 0.95).

US,min.	C(Fe)mg/kg $C \pm \frac{t_p, S}{\sqrt{n}}$	S_r	C(Mg)mg/kg $C \pm \frac{t_p, S}{\sqrt{n}}$	S_r
10	82,7±1,0	0,01	2687±33	0,01
15	84,6±1,1	0,01	2745±34	0,01
20	80,0±0,9	0,01	2720±34	0,01
25	82,4±1,0	0,01	2734±34	0,01
30	83,9±1,0	0,01	2740±34	0,01

Table 6. Selection of ultrasound treatment time in the atomic absorption determination of Iron and Magnesium for the sample "Analgin" (n = 5, P = 0.95).

US,min.	C(Fe)mg/kg $C \pm \frac{t_p, S}{\sqrt{n}}$	S_r	C(Mg)mg/kg $C \pm \frac{t_p, S}{\sqrt{n}}$	S_r
10	89,1±1,1	0,01	7133±89	0,01
15	91,2±1,1	0,01	7195±89	0,01
20	89,2±1,1	0,01	7167±89	0,01
25	88,8±1,1	0,01	7174±89	0,01
30	90,5±1,1	0,01	7187±89	0,01

Table 7. Values of analytical signals of aqueous solutions of Iron and solutions of Iron with a modifier, treated with ultrasound (n = 5, P = 0.95).

C(Fe) g/l	Analytical signals of aqueous solutions of Iron	Analytical signals of aqueous solutions of Iron with a modifier, treated with ultrasound
0,0001	5	6
0,0003	14	17
0,0005	24	29
0,0007	34	41
0,001	50	60

Table 8. Values of analytical signals of aqueous solutions of Magnesium and solutions of Magnesium with a modifier treated with ultrasound (n = 5, P = 0.95).

C(Mg) g/l	Analytical signals of aqueous solutions of Magnesium	Analytical signals of aqueous solutions of Magnesium with a modifier, treated with ultrasound
0,0001	20	24
0,0003	57	71
0,0005	100	121
0,0007	143	166
0,001	200	242

Table 9. The results of atomic absorption determination of Iron using Triton X-100 (w = 5%), stabilized by ultrasound (treatment time 15 min) (n = 5, P = 0.95).

Medicine	Iron content, mg/kg $C \pm \frac{t_p, S}{\sqrt{n}}$	S_r
Paracetamol	159±2	0,01
Coffein	84,6±1,1	0,01
Analgin	91,2±1,1	0,01

Table 10. The results of atomic absorption determination of Magnesium using Triton X-100 (w = 5%), stabilized by ultrasound (treatment time 15 min) (n = 5, P = 0.95).

Medicine	Magnesium content, mg/kg $C \pm \frac{t_p, S}{\sqrt{n}}$	S_r
Paracetamol	3523±44	0,01
Coffein	2745±34	0,01
Analgin	7195±89	0,01

Table 11. Validation by "injected-found out " method of for Iron (n = 5, P = 0.95).

Medicine	Iron content, mg/kg	Iron injection, mg/kg	Iron found out, mg/kg	S_r
Paracetamol	159±2	150	310±4	0,01
Coffein	159±2	80	238±3	0,01
Analgin	84,6±1,1	80	165±2	0,01
	84,6±1,1	40	126±2	0,01
	91,2±1,1	90	180±2	0,01
	91,2±1,1	45	137±2	0,01

Table 12. Validation by " injected-found out " method of for Magnesium (n = 5, P = 0.95).

Medicine	Magnesium content, mg/kg	Magnesium injection, mg/kg	Magnesium found out, mg/kg	S_r
Paracetamol	3523±44	3500	7020±87	0,01
	3523±44	1750	5270±65	0,01
Coffein	2745±34	2700	5442±68	0,01
	2745±34	1350	4093±51	0,01
Analgin	7195±89	7000	14192±176	0,01
	7195±89	3500	10690±133	0,01

Table 13. Estimation of the limit of detection for Iron

№	A_1	A_2	A_3	A_4	A_5	A_6	$\bar{A}$	S_0	C_{min}(mg/l)
1	2	4	3	2	1	2	2,3	0,280	0,014
2	3	1	2	1	3	2	2,0		
3	2	3	2	3	2	3	2,5		
4	1	2	3	2	1	2	1,8		
5	2	4	3	2	1	2	2,3		
6	3	1	2	1	2	3	2,0		C_{lit}=0,015

7	2	3	2	3	2	3	2,5		
8	2	1	2	3	1	2	1,8		
9	4	2	3	2	1	2	2,3		
10	1	3	1	2	3	2	2,0		
11	3	2	3	2	3	2	2,5		
12	2	1	3	2	1	2	1,8		
13	1	3	1	2	3	2	2,0		
14	2	4	2	3	1	2	2,3		
15	2	3	2	3	2	3	2,5		
16	2	3	2	1	2	1	1,8		
17	3	2	1	2	1	2	1,8		
18	3	2	3	2	3	2	2,5		
19	2	1	3	2	4	2	2,3		
20	2	3	2	1	3	1	2,0		

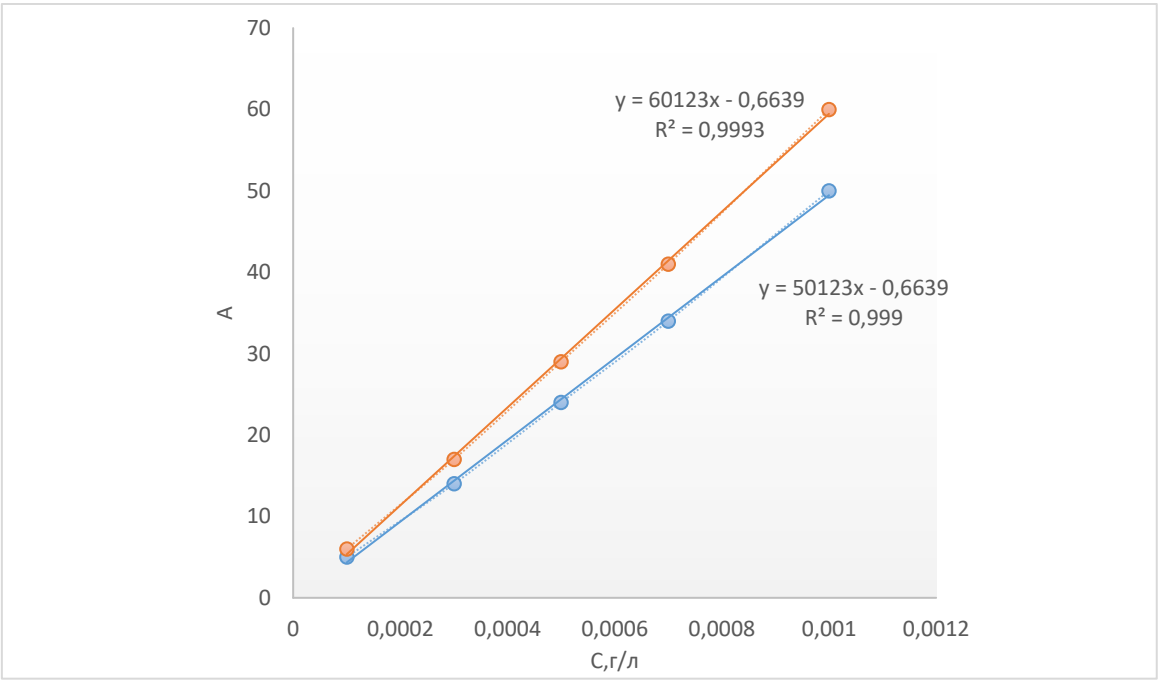

Fig. 1 Dependence on the concentration of Iron of the analytical signal of an aqueous solution of Iron and a solution of Iron with a modifier treated with ultrasound

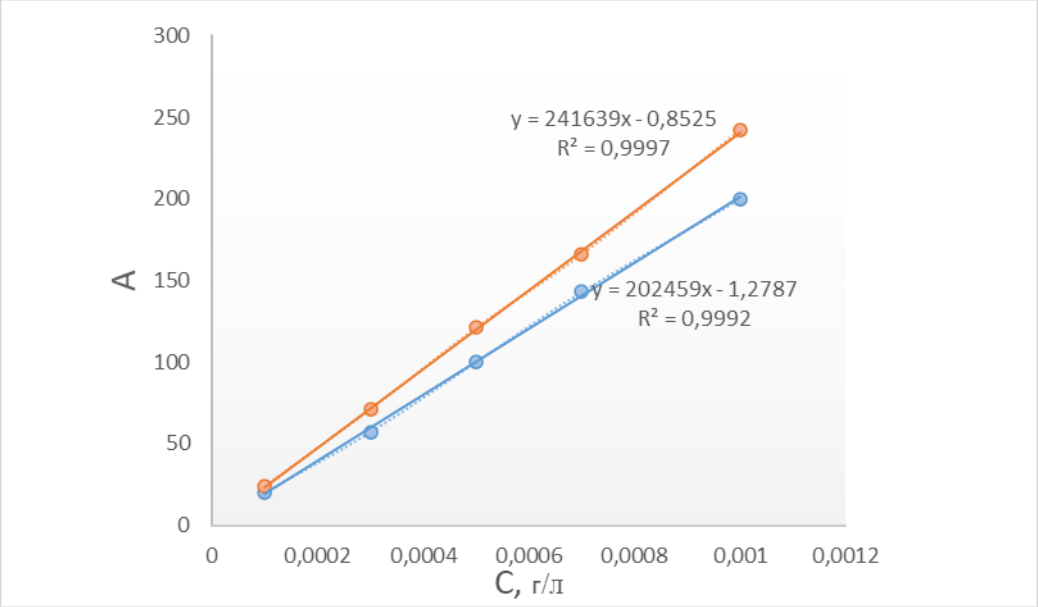

Fig. 2 Dependence on the concentration of Magnesium of the analytical signal of an aqueous solution of Magnesium and Magnesium solution with a modifier, under ultrasound treatment.

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DERIVATIVE SYNONYMS IN AZERBAIJANI

Abstract: *Derived synonyms were formed as a result of the evolution of monosyllabic original synonyms according to the principle and functional nature of synonyms. As the relationship between man and the environment expands, intellectual thinking expands, and with it the need for an appropriate word structure to express new concepts. The emergence of synonyms is directly related to the perception and imitation of the similarity of objects and events that surround a person in the mind of a person. Since monosyllabic synonyms in a language cannot express growing information in general, there is a need for corresponding derivatives. Therefore, at a later stage, corrective synonyms begin to form at the basis of monosyllabic words. The process of language education plays a very important role in the emergence of derivative synonyms. Although at the early monosyllabic stage synonyms appeared in the form of similar root words in different languages, the possibilities of linguistic typologies in the formation of synonyms already in the period of formation distinguish them. Thus, if synonyms in analytically variable languages are formed due to prefixes, suffixes, and even infixes and interfixes, as one of the agglutinative languages, synonyms in the Azerbaijani language are formed due to suffixes. However, synonymous structures occurring at the monosyllabic stage are characterized by interlingual universality. Their study and analysis play an important role in the reconstruction of the semantic potential of many correcting synonyms according to precise and understandable parameters.*

Key words: *derivative synonyms, monosyllabic synonyms, agglutination, universality.*

Language: *English*

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Introduction

Derived synonyms in the Azerbaijani language were formed as a result of the evolution of the original synonyms in accordance with the requirements of precise, clear, specific and at the same time emotional shades of similar meaning. Derived synonyms in this sense can be viewed as a traditional continuation of the original and previous synonyms. As the connections and relationships of people with the environment expand, as their mental and intellectual thinking develops and their perception of interactions between objects and events increases, their need for expression increases. Consequently, new methods are needed to convey concepts that cannot be expressed in monosyllabic synonyms. This need is met by creating new words based on existing words in the language. This need can also be met at the formal stage of language learning. Derivative synonyms are formed on the basis of words with the same root, close root and different roots. In synonymous roots, the identity of the root does not arise, since their derivatives become synonymous.

Although such synonyms have root identity, they are formed on separate suffixes, and the variety of suffixes eliminates the similarity of meaning in the derived form, and the similarity of meaning is ensured in words with the same root. In synonyms with different roots, on the other hand, roots with different meanings indicate that the meanings are closer due to the same suffixes attached to them. An interesting classification is given in the dissertation on the structural features of synonymous synonyms, dedicated to the synonyms of the Karachai-Balkarian language. The dissertation author Akhmatova

Maryam Akhmatovna establishes the classification on the basis of the following linguistic facts: b) synonyms formed from one word with suffix variants: aylanchuk-aylanjuk (fırfıra-spiral) - spiral; c) synonyms with similar meanings are formed with opposite suffixes: oqurlu (uğurlu) - oqursuz (uğursuz) (successful) - (unsuccessful), akıllı (ağıllı) - apılsız (ağılsız) smart (smart) - (stupid); c) word formation from one word to another: jaşlık (youth) - jaşlık (step son) word formation from one word to another; [1, 5]. d) word formation from one word to another: jazıu (letter) - jazıu (fate), necklace (scarf) - necklace (tie, beads, necklace) [1, 5]. Although words corrected with opposing suffixes here more relate to antonyms, and words with a different meaning belong to homonyms, new ideas about homogeneity were put forward in the dissertation. In other theses on corrective synonyms, this issue is analyzed on the basis of specific linguistic facts and the lexical-semantic and stylistic-emotional nature of correcting synonyms is highlighted [2, 26; 3, 134; 7, 38-47; 84-92].

Transitional synonyms began to form in all languages in connection with the general development in the process of the formation of languages. These types of synonyms are not the same in all languages due to their typological structure. For example, in languages with analytic change, synonyms are formed by prefixes and suffixes, and in some cases by infix and interfix. In the Azerbaijani language, synonyms are usually formed with the help of final suffixes in accordance with the requirements of the agglutinative structure of this language. Transitional synonyms of the Azerbaijani language can be summarized in the following classification as an evolutionary version of monosyllabic synonyms.

1.1. Single-root derivative synonyms

Single-root derivative synonyms, due to their structural and lexical-semantic features, form the initial stage of synonymous education through suffixes. That is, at the initial stage, derivative synonyms were formed on the basis of identical root elements, and at later stages of development, the process of synonymization continued with the participation of words with different roots. Since synonyms serve to express similar meanings in a language, they occupy a special place both in the nominal part of nouns and in the verbal parts of speech. Synonyms with the same root formation are formed with different root-based suffixes that retain their independence of meaning and have limited independence. Thus, synonyms are formed both in the noun phrase and in the verb part of speech. Some of the synonyms formed as nouns are based on monosyllabic words with independent meanings, while others are based on monosyllabic words that do not retain independent meanings. Examples of single-root synonyms formed from independent root morphemes are these words: gör-see, görmək-görünüş (see-visibility), rain-rainy based on the root yağ - (to go about rain), yetkin-yetişmiş-mature based on the root yet -Cook with bişkin-bişmiş root (cooked-baked).

In the Azerbaijani language, as well as on the basis of words with limited independent meaning, one can give an example of the formation of synonyms related to the nominal part of speech with the same root: qud-: quduz- qudurğan-mad-spoiled, yal: yalqız-yalnız-lonely, yan-: yanıl-yanlış-error, il-: ilişiklik-ilişkənlik-ratio, iş-: işıltı-işartı-flicker, büt-: bütöv-bütün-integer.

An important part of the derived synonyms are also formed as synonyms consisting of verbs. The possibilities of derivative synonyms formed in the form of a verb attract attention with their richness and diversity in the Azerbaijani language. This is due to the fact that verbs are mobile as part of speech, and since they are mobile, they have acquired a special activity in the information process. Some of the cognate synonyms formed like verbs are based on roots that have independent meanings, while others are based on roots that do not retain independent meanings. Examples of synonyms formed from roots with independent meanings are words with the following suffixes: -la, -var: su-sula-suvar - water, -li, -ish: yig-yigil-yigish-gather, -ül, -üş : üz- üzül-be upset; bük-bükül-büküş, -lan, laş: ara-aralan-aralaş-move away, bol- bollan-bollaş- be in abundance, sal-sallan- sallaş- shake up, top-toplan-toplaş-pull yourself together.

a + la-ça + la; par-: parala-parçala (to rip apart); a + lan-ça + lan: par-: paralan-parçalan (decompose): ar-: arala-aralan (move away); -man-maş: dır-: dırman-dırmaş (climb); -şa-şan: qur: qurşa-qurşan (get carried away); -ür + üş- ür + ləş; süpürüş-süpürləş (fight); -pən-pəş: tər-: tərpən-tərpəş (move); ıq + lan-ıq + laş; işıqlan-işıqlaş (to dawn), aş + lan-aq + laş; qoçaqlan-qoçaqlaş (grow old); -lan-laş; al-allan-allaş (deceive yourself); ı + lan-ı + laş; ac-: acılan-acılaş (upset), aca + lan-aca + laş; bal-: balacalan-balacalaş (decrease); daq + lan-daqlaş (fight); ün-mə + lən; bür-bürün-bürmələn (wrap yourself up); an-aş-: dar-: daran-daraş (gather yourself); iş-iş + il: dəy-: dəyiş-dəyişil (change) və s.

1.2. Synonyms with close roots

Root synonyms are derived from words that have similar meanings. Since the root structure of root synonyms consists of closely related words, the suffixes that make up them are also uniformly derived. Established synonyms and their derivatives serve to express the subtle nuances of meaning arising from the relationship between man and the environment. Since the synonyms of the same root are rich in the Azerbaijani language, derived synonyms formed on their basis can be found within separate parts of speech:

Derived from the noun:

Synonyms derived from a noun consist mainly of adjectives: cadar-cadarlı (uneven), codar-codarlı (nonsmooth), cərgə-cərgəli (ordinary), sıra-sıralı (regular), bağ-bağlı-badaq-badaqlı (garden) , səs-səsli-küy-küylü (noisy); külək-küləkli-yel-yelli (windy), piy-piyli-yağ-yağlı (bold), iy-iyli-qoxu-qoxulu (smelling), yağır-yağırlı-yara-yaralı (wounded).

Nouns formed from adjectives: synonyms formed from adjectives with a similar root in meaning are mainly formed as nouns: açıq-açıqlıq-aydın-aydınlıq, sərin-sərinlik-soyuq-soyuqluq, doğüzüküzügüzügüzüg-druluq- doğru-doğruluq, yaman-yamanlıq, pis-pislik, incə-incəlik, yuxa-yuxalı. open-clear-clear, cold-cool, truth-correct, straight-true, evil-evil, subtle-subtle.

Imitators formed from imitation words: Synonyms formed from imitative words are formed as nouns in terms of meaning. However, in some cases, these synonyms can also have an adjective function. Therefore, such synonyms can be considered as derivatives of the noun, which are formed as adverbs: this part of synonyms is formed as synonymous strings of adverbs: tənti-təntik (in a hurry), tələs-tələsik (hastily), arxa-arxadan (behind), orta-ortalıqda (among), ard-ardınca (sequentially), arxa-arxasınca (sequentially).

Verbal formations:

Synonyms formed from a verb are composed of a noun, an adjective and a verb. Since synonyms formed from a verb as nouns also have similar roots, the means of word formation in them also consist of homogeneous elements.

Examples: burkhul-burkhulma (to collapse), daya-dayaq (support), dirə-dirək (support), ayrıl-ayrılma-aralan-aralanma (part), axtar-axtarma-ara-arama (do not look for), acış-acışma (stubborn), giciş-gicişmə (itch), bağla-bağlama (close), düyünlə-düyünləmə (tie a knot), köp-köpük (foam), döy-döyüş (fight), vur-vuruş (fight), vur-vuruş (fight take), sanc-sancı (colic), bürüş-bürüşük (frail).

Some of the synonyms derived from the verb are also formed as adjectives. Examples: bat-batıq (concave), bas-basıq (pressed), büz-büzük (dented), bük-bükük (collapsed), cır-cırıq (torn), yırt-yırtıq (perforated), ay-ayıq (vigorous) , oy-oyaq (awakened), qap-qapalı (closed), ört-örtülü (closed), qırış-qırışıq (dented), bürüş-bürüşük (frail), qır-qırıq (broken), sınıq

The other part of the synonyms formed from the verb is formed as a predicate: bax-baxmaq-gör-görmək-look-see, bələ-bələmək-bürü-bürümək-swaddle-wrap, böyü-böyümək-grow up; irilən-irilənmək-to increase, dalaş-dalaşmaq-to fight, savaş-savaşmaq-to fight, aldat-aldatmaq-to deceive, tovla-tovlamaq-to persuade, atıl-atılmaq-to jump, tullan-tullanmaq-simq-to jump off, catch a cold, qatıl-qatılmaq, qarış-qarışmaq-intervene, dartmaq-dartışmaq, çəkmək-çəkişmək-pull; dara-daranmaq, darat-daratmaq-comb; kəs-kəsilmək, doğra-doğramaq-cut.

1.3. Synonyms with different roots

In different root synonyms, the roots of which they are composed have different meanings, so most of them are formed by similar suffixes. At the same time, on the basis of the enrichment of the lexical-semantic and derived functions of the language, the participation of individual suffixes in the formation of synonymous roots is observed. Synonyms formed by similar or identical suffixes consist of both nouns and verbs. The following derivational suffixes are mainly involved in the formation of synonyms consisting of names:

With the participation of the suffix -lik (-lik, -luq, -luk): bir-birlik-unity,, bütöv-bütövlük-integrity: ay-aylıq-monthly, don-donluq (aylıq vəsait) -salary; sıx-sıxlıq-density, kip-kiplik-tightness; düzən-düzənlik-plain, çöl-çöllük-wilderness .:

With the suffix -li (-li, -lu, -lü): biçim-biçimli-shaped, yaraşıq-yaraşıqlı-beautiful, dağıntı-dağıntılı-destroyed, töküntü-töküntülü-disorder; ağız-ağızlı (iti) -sharp, kəsər-kəsərli-sharp, şələ-şələli, yük-yüklü-submerged; el-elli, yer-yerli-local.,

With the participation of the suffix -lik (-lik, -luq, -luk): bir-birlik-unity,, bütöv-bütövlük-integrity: ay-aylıq-monthly, don-donluq (aylıq vəsait) -salary; sıx-sıxlıq-density, kip-kiplik-tightness; düzən-düzənlik-plain, çöl-çöllük-wilderness .:

With the suffix -li (-li, -lu, -lü): biçim-biçimli-shaped, yaraşıq-yaraşıqlı-beautiful, dağıntı-dağıntılı-destroyed, töküntü-töküntülü-disorder; ağız-ağızlı (iti) -sharp, kəsər-kəsərli-sharp, şələ-şələli, yük-yüklü-submerged; el-elli, yer-yerli-local.,

-Sız (-siz, -suz, -süz) with the suffix: biçim-biçimsiz, yöndəm-yöndəmsiz-formless, ağız-ağızsız, kəsər-kəsərsiz-powerless; acıtma-acıtmasız, turşutma-turşutmasız-not swollen.

With the participation of the suffix -ma (-mə): boşal-boşalma, laxla-laxlama-wobble; ağar-ağarma-whitening, işıq-işıqlanma-enlightenment, dirçəl-dirçəlmə-revival, canlan-canlanma-revival; dola-dolama-roll up, sarı-sarıma-tie; qaçış-qaçışma-escape, yarış-yarışma-competition.

-With the presence of the Iq suffix (-ik, -uq, -ük): dolaş-dolaşıq-confusing, qarış-qarışıq-mixed.

In the Azerbaijani language, a group of verb synonyms has formed with the participation of the same and similar suffixes. The following suffixes are observed when forming synonymous verb series from words with different roots:

With the participation of the suffix -lan (-lən): gizlə-gizlən-hide; dola-dolan-spin, fırla-fırlan-spin; sıra-sıralan-order; qurdala-qurdalan-move, eşələ-eşələn-poke around.

With the participation of the suffix -lash (-ləş): ayaq-ayaqlaş-to reconcile, uyğun-uyğunlaş-to converge; ara-aralaş-give up, uzaq-uzaqlaş-move away; qarşıla-qarşılaş-meet.

- With the suffixes Iş (-iş, -uş, -üş): al-alış-adapt, öyrət-öyrəş-learn; açıl-açılış-open, isin-isiniş-get used to; boğ-boğuş-fight; qımılda-qımıldaş-move, tərpən-tərpəş-move.

With suffixes -A (-ə), -la (-lə), -ıt (-it, -ut, -üt): göz-gözə (tikmək) eye to eye (to sew), çit-çitç (yamayıb tikmikk) - put a patch; basma-basmarla-grab, süpür-süpürlə-grab.

Conclusion

Some synonyms with different roots are also formed with the participation of different suffixes. Just as the root structure of such synonyms has no similarity in meanings, the suffixes themselves do not have a similar derivational function. However, the general content of the words corrected in this way has close semantic connections. This is an indicator of the rich, varied and wide range of lexical and semantic potential of the Azerbaijani language.

When the monosyllabic root structure of some corrective synonyms does not retain its independent meaning, their initial meanings are usually expressed in the corresponding derivatives. At the same time, these monosyllabic roots are universal, as are homonyms, since they are the product of the formless stage. Consequently, in languages of different systems, it is possible to determine the adequacy of these synonymous roots. This method is not only intended to test the adequacy of different languages in a formal comparison. These comparisons also determine the semantic features of the limited monosyllabic structure of the Azerbaijani language. For example, a monosyllabic word (par) that is synonymous (para-parça-split, torn apart) is not semantically independent. Its original meaning can only be understood from the corresponding derivatives. In the Russian language there is also the word "para", which is formed on the basis of the root. In Russian, this word means divided into two parts, a pair, and the word partial, originating from one root, means division into parts. [6, 383, 389]. In English, the word parcel, derived from the root, means to divide into parts, divide, divide, divide into parts, cut the word pare, cleanse [5, 359].

In Persian, the word pair, formed from this root, means a piece, part, and the word means divided into parts, divided into parts [4, 493].

In general, the definition of the universal characteristic of monosyllabic synonyms provides a good basis for the statement that these linguistic units are mental in their structure.

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DEVELOPMENT OF A GREEN ECONOMY: PROBLEMS AND SOLUTIONS

Abstract: *The green economy has been recognized as a completely new science in recent years. This direction is gaining popularity in the study of economics based on a combination of several subject areas - economic theory and ecology and green economics, occupies a new direction in scientific knowledge. The article examines the development of a green economy in Uzbekistan.*

Key words: *green economy, natural resources, greening, energy resources.*

Language: *English*

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Introduction

A green economy is an economy that aims to return end-use products to the production cycle. A green economy is aimed at the economical consumption of those resources that are currently subject to depletion, for example, minerals (oil, gas) and the rational use of natural resources. The Uzbek clean technology industry is currently at the initial stage of commercializing the available scientific potential.

One of the main challenges in the green economy is to change people's views on energy consumption. Then energy-saving technologies will become in demand, smart energy-efficient houses will appear. Already today, in the Republic of Uzbekistan (RUz), certain actions are being taken to protect the natural environment. The strategy of Uzbekistan's transition to a "green" economy involves an increase in the share of renewable sources, access of 100% of the population to inexpensive energy supply, the development of electric transport and the creation of an effective waste recycling system [1].

On October 4, President RUz Shavkat Mirziyoyev approved the Strategy for Uzbekistan's transition to a green economy for 2019-2030. The strategy emphasizes the low level of energy efficiency of the economy, irrational consumption of natural resources, slow technology update, weak participation of small businesses in the implementation of innovative solutions for the development of a green economy hinder the achievement of priority national goals and objectives in the field of sustainable development of the among the targets for the implementation of the strategy are to reduce the specific greenhouse gas emissions per unit of gross domestic product by 10% from the 2010 level, to bring the share of renewable energy sources to more than 25% of the total electricity generation, to provide access to modern, inexpensive and reliable energy supply to 100% of the population and sectors of the economy, expanding the production and use of motor fuel and vehicles with improved energy efficiency and environmental friendliness, as well as the development of electric transport, the introduction of drip irrigation technologies on an area of up to 1 million hectares and an increase in yields to 20-40% of crops cultivated on them [2,3].

The implementation of the strategy will contribute to better governance in the field of energy efficiency of the economy, rational use and conservation of natural resources, reduction of greenhouse gas emissions, access to green energy, creation of green jobs and climate resilience.

The priority directions of the strategy are to increase the energy efficiency of the basic sectors of the economy [4]:

In the electric power industry: reconstruction and modernization of generating capacities of operating power plants with the introduction of highly efficient technologies based on steam and gas and gas turbine plants, complete equipping of power consumption systems with automatic control and metering devices.

In the field of heat power engineering: introduction of new technologies for generating heat energy, modernization and reconstruction of outdated boiler equipment, equipping consumers with modern metering devices, using solar collectors for heating water in boiler houses.

In the oil and gas industry: reduction of losses of natural gas during its production, processing, transportation and distribution due to the modernization of compressor stations, low and medium pressure gas distribution networks, as well as the gas transmission system with the introduction of effective technologies to control the loss of hydrocarbon resources (SCADA), the introduction of alternative energy sources at oil and gas production facilities.

Diversification of energy consumption and development of the use of renewable energy sources[5]:

- In the field of renewable energy sources: improving tariff policy and approving ceiling tariffs for the purchase of electricity, modernizing and restructuring the power supply system, localizing the production of equipment for generating energy from renewable energy sources.

- In the field of construction and maintenance of buildings: implementation of state programs to improve the energy efficiency of buildings, including the reconstruction of multi-story residential buildings, revision at least once every 5 years of building codes in the direction of stricter energy efficiency requirements, the widespread introduction of a "closed" heat supply system for central heating, development system of differentiated tariffs to create incentives for energy saving; introduction of energy efficient standards for household equipment.

- In the transport sector: expanding the production and use of vehicles with improved energy efficiency and environmental friendliness in accordance with Euro 4 and higher standards, electric vehicles, cars with hybrid engines, gas-fueled, ensuring the phase-out of the use of hydrocarbon fuels and stimulating the development of electric transport, development and development of new transport and logistics systems, development of road infrastructure.

Adapting and mitigating the effects of climate change, improving the efficiency of natural resource use and preserving natural ecosystems.

- In the field of water management: prevention of further salinization and deterioration of land quality, construction and reconstruction of hydraulic structures, pumping stations and reservoirs, widespread use of ICT and innovations in water management and the use of energy-efficient and water-saving technologies for irrigation of crops [6].

- In the field of agriculture: restoration of degraded pastures, diversification of crops, prevention of pollution of water sources with agricultural waste, breeding of highly productive breeds of animals and plant species resistant to salinization, drought and other hazards and risks.

- In the field of solid waste (MSW) management: the development of sanitary cleaning infrastructure aimed at full coverage of the population with services for the collection and removal of solid waste, the creation of an efficient and modern solid waste processing system, the use of solid waste facilities in the form of sources of alternative energy.

The implementation of the strategy will involve state and economic management bodies, local executive authorities, citizens' self-government bodies and other civil society institutions, international organizations, the private sector, as well as the population[7].

Back in December 2008, a directive was adopted by the European Parliament, according to which 27 EU countries plan to bring the use of alternative energy sources to 20% of the total by 2020.

In some European countries this figure is already exceeding 20%. In Denmark, for example, wind energy alone provides 21.3% of the total energy in the grid, in Sweden and Finland, 20-25% of heat generation comes from biomass. Worldwide annual growth rates in the use of solar energy are on average 60%, wind energy - 30%. The advantages of the priority use of alternative energy sources for all countries are undeniable: environmental friendliness, no emissions, and the breadth of the spectrum of renewable energy sources.

The possibilities of alternative energy sources are extremely relevant. In comparison with the EU countries and the USA, the use of renewable energy sources in the Republic of Uzbekistan today is at a low level. The current situation can be explained by the sufficient availability of fossil energy carriers (natural gas). One of the main obstacles to equipping generating capacities based on solar panels or wind turbines is the absence of a provision on an incentive tariff at which the state would purchase electricity generated from them.

In addition, there are no statistics on the number of wind turbines or solar panels involved in industry or agriculture. At the beginning of 2010, the total capacity of wind turbines in Russia was 18 MW, which is equal to only 0.008% of energy generating facilities in Russia (220 GW). For four years, this figure has increased by only 4 MW. The wind energy fund consists of 1,600 small installations with

capacities ranging from 0.1 to 30 kW and 10 large wind farms providing 90% of the total capacity [8].

There are more than 20 wind turbine manufacturers in the country, but they all work in the field of medium and small generators - no more than 500 kW. Whereas in the Russian Federation the absence of domestic consumption of solar energy can be explained by the fact that there are sufficient levels of solar radiation in the Russian Federation, in the Russian Federation they are in South Siberia, the South-West, and the Far East. As a result, in the first half of 2010, the total capacity of the operating photovoltaic plants was no more than 1 MW.

Hydrogen energy, in spite of the large theoretical backlog, continues to be without commercially available products. In 2008, at the state level, a goal was set - by 2020, to reduce the energy intensity of the country's economy by 40%. Today, the main problems with energy consumption in the country are the arrangement of energy meters in the private sector and in industry[9,10].

Projects in the field of management of storage and transmission of electrical energy in Uzbekistan are still less developed. It is necessary in the country to introduce smart energy systems into the existing structure of electricity transportation.

The green economy is precisely the tool that facilitates the transition to sustainable development. The United Nations Environment Program (UNEP) defines a “green economy as contributing to improved well-being and social justice, while significantly reducing environmental risks and environmental deficits[11].

Another more complex definition of a green economy is one in which vital links between the economy, society and the environment take place, and in which production processes and consumption patterns are transformed while contributing to waste reduction, pollution and efficiency. use of resources, materials and energy, revitalize and transform economies, create decent employment opportunities, promote sustainable trade, reduce poverty and improve equity in income distribution.

A powerful incentive for the greening of economic activity in market conditions is the growth in demand for environmentally friendly products from both households and other entities.

Market, including the state. Analysis of the processes, factors and conditions for the formation of the aggregate "green" demand, the results of which are necessary for the scientific substantiation of the essence, structure and functions of the mechanism for stimulating the greening of the economy.

According to the statistical report of the independent non-profit research institute for organic farming FiBL, published in 2017, the global organic farming market has grown for the period 2000–2015 4.5 times, amounting to $ 81.6 billion in 2015.The USA is the leader in terms of retail sales (47%), the combined share of European countries is 38%.

It is expected that the countries with the highest consumption of eco-products per capita are Switzerland (262 euros per year) and Denmark (191 euros). Sweden, France, Luxembourg, Austria and Germany are also among the top ten leaders in this indicator that is countries characterized by an active environmental policy and a high level of environmental culture of the population. As the researchers note, the motives for purchasing organic products can vary.

In the United States, the main motive is rather selfish - taking care of their own health, while in Germany the population is more concerned with the state of the natural environment.

In July 2020, a regional ministerial conference on the "green" economy was held in Tashkent, where four directions were named towards the ecological well-being of the republic:

- Development of a program that provides for the rational use of energy, work to minimize greenhouse gas emissions, reduces waste generation, restore and save ecosystems. Energy consumption is mainly in cities (75 percent). Uzbekistan has ratified the Paris Agreement and assumed obligations to reduce emissions to standard values. The transition to a green economy is aimed at coordinating labor sectors within the framework of government programs. For example, in the transport sector, the expansion of the use of alternative “green” fuels (mainly liquefied gas and synthetic fuels from plastics).

- The second area is related to the global Sustainable Development Goals, seven of which are environmental.

- Mitigation of negative consequences associated with global climate change, which is intensifying in the Central Asian region due to the drying up of the Aral Sea.

One of the important priorities voiced in the President's Address to the Oliy Majlis is the increased attention to environmental issues, especially in the Aral Sea region.

The agro-ecotourism project "My garden in the Aral Sea" is being implemented in Uzbekistan, aimed at eliminating the consequences in the region and increasing the number of tourists.

Expanding the use of renewable energy sources Uzbekistan has great potential for the development of wind and solar energy. Projects are already being implemented that will allow increasing the share of renewable sources to 30% in ten years.

In Uzbekistan, the GEFF (Green Economy Financing Facility) project provides funding, advice and grants to private companies to improve their competitiveness through high-performance technologies and practices.

A green economy minimizes not only the use of energy and water in production and consumption, but also the negative impact on the environment and climate.

The GEFF is supporting this transition by providing financing for investments in Green Technologies:

-Technologies that minimize energy use

-Technologies that generate energy from renewable sources

-Technologies that protect water resources.

In accordance with the GEFF agreement, the EBRD provides loans to participating local financial institutions (partner banks) to refinance private borrowers. These funds are being invested in projects that minimize the impact on climate, in line with the EBRD's global strategy to transition to a green economy, reduce greenhouse gas emissions and improve energy efficiency.

GEFF Uzbekistan is supported by a dedicated team of consultants from among engineers, environmental, finance and marketing experts who will offer partner banks and their client's direct support and advice throughout the life cycle of a green project using best-in-class technologies. The customer support package is free of charge

Technical assistance is provided by a local GEFF team that assists companies at various stages of project development, investment appraisal and project implementation. This helps to identify the best solutions and ensure the successful financing of quality green economy projects.

In turn, Ipak Yuli Bank received a credit line of $ 5 million from the EBRD to finance private companies in the green economy.

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FOREIGN LANGUAGE ACQUISITION THROUGH MOODLE PLATFORM

Abstract: *In 2020 year, teaching through MOODLE platform was being popular, and in need due to Covid-19, however, it gave a lot of progress to science: changed teaching system, enhanced learners' linguistic and technical (computer-based knowledge) skills more than ever before, promoted creation of virtual atmosphere for teachers and learners. Furthermore, English language have been taught to engineering students through this platform, as result, they all set learning English and being assessed electronically. The article reveals the role of computer-based tests as an integral component of an ESP course for engineering students who need to communicate both in written and spoken contexts effectively in English. Computer-based tests are considered effective up-to-date means of control. In addition to this, the role of electronic tests in optimization of the teaching process is reviewed. Electronic data (contexts, videos, tests) have been designed with in order to fully improve learners' linguistics and subject matter skills. Besides, this e-learning have reflected target needs of learners at Karshi Engineering-Economic institute, Karshi, Uzbekistan.*

Key words: *MOODLE platform, e-learning, tests.*

Language: *English*

Citation: Yakubova, L. (2021). Foreign Language Acquisition through MOODLE Platform. *ISJ Theoretical & Applied Science, 01 (93)*, 217-219.

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Scopus ASCC: *1203.*

Introduction

The progressive development and diffusion of modern media and Internet technologies have resulted in the formation of the new global computer-mediated communication environment (Obdalova, 2009; Sysoev, 2012). In the current situation modern specialists need to communicate in a foreign language and proficiency in a foreign language, English in particular, has become an essential part of specialists' professional instrument to communicate and use. In connection with the existing situation, the objective of higher education institutions is to train future specialists to build a professional dialogue with their experts coming from abroad. The Moodle represents one of the most widely used open-source e-learning platforms, that enables the creation of a course website, ensuring their access only to enrolled students. This platform allows the exchange of information among users geographically dispersed, through mechanisms of synchronous (chats) and asynchronous communication (discussion forums). In a functional perspective, it has easily configurable features, allowing the creation of student assessment processes (quizzes, online tests and surveys), as well as managing their tasks with their timetable, besides offering a wide variety of complementary tools to support the teaching and learning process. English have been taught to engineering students within 2020 year.

We carried out experiments; set up close-ended questionnaire for survey with students according to effectiveness of e-learning and English language acquisition, especially, increasing vocabulary data, comprehension skills. Increasing number of students participated in the interview with their different views. We made needs analysis of collected data; as a result, findings were more effective than expected.

E-Learning

Using state-of-the-art IT in the foreign language teaching process, we do not only form the language skills, but also develop some other skills and abilities that allow forming both sociolinguistic and pragmatic competence. The development of this form of learning is nearly concerned in the e-learning development in terms of IT as a fundamental principle (Jih & Reeves, 1992).

In our experience, e-learning is training based on the use of information and telecommunication technologies as it delivers teaching materials to students via the computer net. This kind of learning is often used for distance courses (Hoole, 2012).

E-learning has several advantages:

• opportunity to choose the most interesting subject from the course for a student;

• autonomy and flexibility: students learn to be initiative in terms of time and place of learning;

• personal choice of pace of learning, a variety of tools (video, audio, animation, text, images) and activity forms (games, team work, individual activity);

• involvement in the leaning process by means of various learning platforms;

• wide possibilities in managing and consulting students to prevent possible misfits in learning despite difference in location of a student and a teacher;

• social equality is equal chance to get education in spite of residence, health status and financial statement.

E-learning may have also a number of drawbacks, such as:

• lack of social contact between a teacher and students, between learners themselves (if not provided by course moderation);

• possible gaps, poor understanding of the content of training due to insufficient tutors' monitoring;

• it requires strict self-discipline, high degree of consciousness, i.e. quite well-formed autonomy skills;

• the goal cannot be achieved in training if there is no well-organized counseling;

• educational process based on writing with no opportunity to express their knowledge in oral form can be stumbling block for some students;

• requirements for good technical equipment (computer and Internet access).

Blended learning can enhance students' motivation to learn due to the fact that students are free to choose the modules of the course, meet their needs when there are some gaps in knowledge. In addition, students receive online feedback from the teacher who helps to accept all the details of the course. Face-to-face classes let students prove appropriate and efficient state of accepting the teaching materials, get feedback and correct their obtained results (Cheremisina Harrer, et al., 2015).

Methods of Research

We made experiments; carried out a survey with forty students from the Faculty of Oil and gas engineering, Karshi Engineering-Economic institute (online). Survey based on close-ended questionnaire, focused on how effective MOODLE platform was for English language acquisition. Respondents were invited to be interviewed by us electronically (telegram platform) summer 2020.

Result

1. Ten of them responded:

We used e-learning platform more than ever, and it was more interesting than classroom teaching.

2. Five of them stated:

We preferred E-learning, concern is reflected on needs, as it enhanced their vocabulary background.

3. Five of participants gave personal views on e-learning:

Language acquisition electronically gave us more time, no limit, no restrictions.

4. Ten of respondents said that;

We prefer more classroom teaching, as it give us in time feedback what we have learned, and assessed, enthusiastic atmosphere.

5. Ten of them expressed their ideas differently;

Our prior experience and knowledge is increased thanks to electronically data stored in e-platform.

Conclusion

Teaching English to engineering students through MOODLE platform being in need because it fulfils language competence of learners in daily use. E-learning is more focused on innovative teaching than traditional one. Furthermore, it improves linguistics skills of learners, giving them more, time, more e-data.

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DYNAMICS OF CHANGING THE TEMPERATURE GRADIENT DURING TITANIUM ALLOY COOLING

Abstract: *Description of the thermodynamic cooling process of the ingot (titanium alloy) at the time range of 0-120 s is presented in the article.*

Key words: *cooling, the casting, titanium alloy, the temperature gradient.*

Language: *English*

Citation: Chemezov, D., et al. (2021). Dynamics of changing the temperature gradient during titanium alloy cooling. *ISJ Theoretical & Applied Science, 01 (93),* 220-222.

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Introduction

The wide use of titanium alloys in various industries is due to high strength and low density of material [1]. Casting is one of the ways to produce workpieces from titanium alloys [2]. Titanium alloy in the molten state is chemically active, so during the

casting process, the molds must have a high inertia. Failure to comply with this requirement during titanium alloys casting leads to an uneven change in the cooling temperature of the surface layers of the crystallizing casting in contact with the mold surfaces [3-10]. This leads to the uneven structure of the casting after cooling. Let us consider the cooling phase of titanium alloy under standard conditions of the casting process based on the results of computer modeling.

Materials and methods

The mathematical calculation was performed in the Comsol Multiphysics program to determine the thermodynamic processes in the volume of the cooling casting made of titanium alloy. The casting model was the ingot with dimensions of 100×50×10 mm. The initial temperature of Ti-6Al-4V titanium alloy (UNS R56400) during cooling was adopted 1923 K. The thermodynamic processes calculation during the casting cooling was performed according to the heat transfer equation (1)

$$d_z \rho C_p \frac{\partial T}{\partial t} + d_z \rho C_p u \cdot \nabla T + \nabla \cdot q = d_z Q + q_0 + d_z Q_{ted}, \quad (1)$$

where d_z is the domain thickness in the out-of-plane direction; ρ is density; C_p is heat capacity; T is the temperature; t is the time; u is the velocity field; q is the heat flux vector, $q = -d_z k \nabla T$; Q is the heat source; q_0 is inward heat flux, normal to the boundary; Q_{ted} is thermoelastic damping; k is thermal conductivity.

The cooling process time of the casting model was adopted 120 s.

Results and discussion

The cooling process of the casting model is presented by the color contours of the material temperature gradient. The results were recorded every 15 seconds from the specified casting cooling range.

The contours of the cooling temperature gradient of the casting model are shown in the Fig. 1.

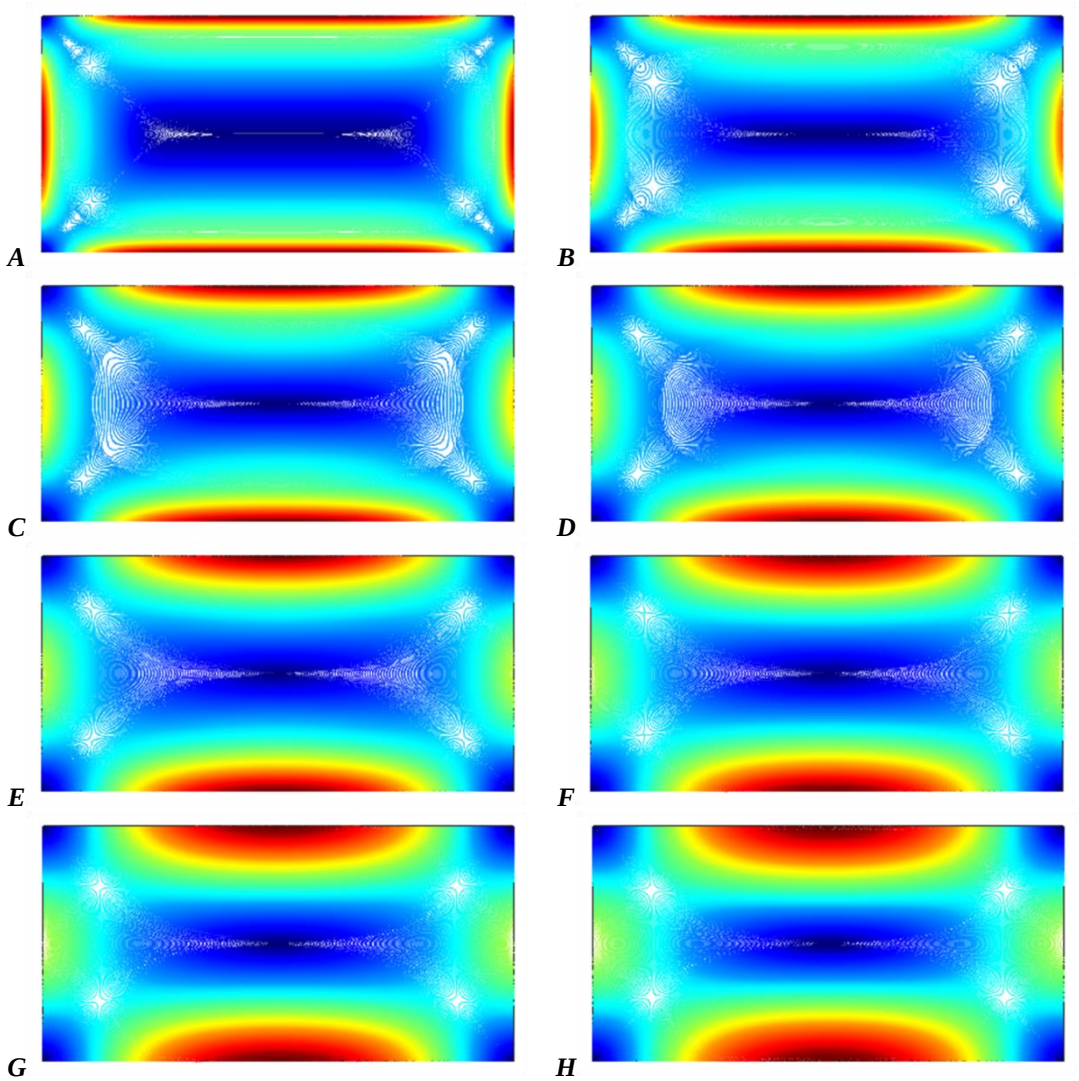

Figure 1 – The contours of the cooling temperature gradient of titanium alloy: *A* – 15 s; *B* – 30 s; *C* – 45 s; *D* – 60 s; *E* – 75 s; *F* – 90 s; *G* – 105 s; *H* – 120 s.

The dark red contours on the casting model indicate the maximum value of the temperature gradient, while the blue contours indicate the minimum value of the temperature gradient. The calculation of the spatial configuration of the thermally stressed state of the casting during cooling allows us to determine the volumes in material that will be subject to the cracks formation.

During the cooling process, the temperature gradient value in the surface layers of the crystallizing casting is more than the temperature gradient value in the inner layers. At the same time, in the surface layers distributed along the casting length, the volume of the temperature gradient will increase over time taking into account a decrease in the temperature of material. The reverse thermodynamic process is observed in the surface layers distributed along the casting width. In the middle part of the casting, the temperature gradient for the considered cooling range in the mold practically does not change and has the ellipse shape. This indicates uniform cooling rate of the given volume of the casting.

Conclusion

Thus, the cracks formation during titanium alloy cooling is predicted at the boundaries of the surface and inner layers of the casting. The movement direction of the temperature gradient contours from the diagonals to the middle part of the ingot leads to a decrease in the intensity of the temperature change in the surface layers distributed along the casting width.

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RESEARCH OF THE KINEMATIC PARAMETERS OF LOADING OF THE BASIC MECHANISMS OF THE DRILLING RIG DURING DRILLING OF THE STEP

Abstract: *The article provides diagrams of the nature of the loading of the rod by axial force. And also considered the advantages and disadvantages (cartridge, rotary and spindle) of the kinematic diagram of the rotary-feed mechanism (RPM) of the drilling rig. The formulas of the hardness of the drilled rock, the duration of the elementary cycle, the weight coefficients, the torque of the bit, the power of the PMM and the power of the compressor drive were determined.*

Key words: *Rod loading, weight coefficients, bit rotation torque, HPM power, compressor drive power, rotary feed mechanism, singlepass technology, maltipass technology.*

Language: *Russian*

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ИССЛЕДОВАНИЕ КИНЕМАТИЧЕСКИХ ПАРАМЕТРОВ НАГРУЖЕНИЯ ОСНОВНЫХ МЕХАНИЗМОВ БУРОВОГО СТАНКА ПРИ ОБУРИВАНИИ УСТУПА

Аннотация: *В статье приведены схемы по характеру нагружения штанги осевым усилием. А также рассмотрены преимущество и недостатки (патронная, роторная и шпиндельная) кинематической схемы вращательно-подающего механизма (ВПМ) бурового станка. Определены формулы крепости буримой породы, длительность элементарного цикла, весовые коэффициенты, момент вращения долота, мощность ВПМ и мощность привода компрессора.*

Ключевые слова: *Нагружение штанги, весовые коэффициенты, момент вращения долота, мощность ВПМ, мощность привода компрессора, вращательно-подающий механизм, технология «синглпас», технология «малтипас».*

Введение

Буровой станок предназначен для бурения вертикальных и наклонных скважин диаметром до 400 мм и глубиной до 40-60 м в породах с пределом прочности от 6 до 20 МПа. В общем случае, конструктивно буровые станки всех известных фирм-изготовителей включают платформу - 1 (рис. 1.1) на которой располагаются: кабина машиниста - 2, машинное отделение - 3 в котором расположены компрессорная установка и электро-гидроборудование [1,7].

Платформа - 1 жестко или шарнирно базируется на гусеничном ходовом оборудовании - 4. Только у станков, выпускаемых фирмой «Хаусхерр» (ФРГ), платформа - 1 установлена на гусеничном ходовом оборудовании - 4 посредством опорно-повторного устройства - 5. Сверху на платформе установлена мачта - 6 с возможностью наклона при бурении до 300, а при транспортировании до 900 с помощью, как правило, двуногой стойки - 7 и гидроцилиндров - 8. В мачте расположены вращатель бурового става и

механизм его подачи, образующих вращательно-подающий механизм (ВПМ).

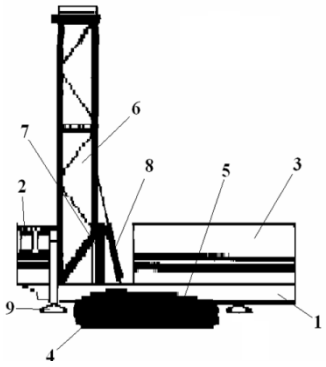

Рисунок 1. - Принципиальная компоновочного схема карьерного бурового станка.

Также, в мачте может размещаться магазин со штангами. Платформа - 1, оснащенная аутригерами - 9, образует систему горизонтирования бурового станка.

По типу силовой установки различают станки электрические и дизельные.

Конструкция ВПМ определяет принципиальные различия моделей станков (вне зависимости от их типа), диапазоны изменения частот вращения и скоростей подачи инструмента, величины осевых нагрузок, крутящих моментов, а также длительность вспомогательных операций по приведению бурового става в рабочее положение и его подъема после окончания бурения скважины. [1,2,3]

В зависимости от силовой схемы нагружения става привод его вращения может размещаться внизу на платформе или наверху на подвижной каретке.

По характеру нагружения штанги осевым усилием различают следующие схемы. С нижним приложением нагрузки (обычно осуществляемым зажимным патроном или неподвижным ротором) и с верхним, действующим на всю длину штанги.

В настоящее время как на отечественных, так и на зарубежных станках шарошечного бурения применяется три принципиальные схемы ВПМ:

- патронная; - роторная; - шпиндельная.

Патронная схема ВПМ (рис. 2а) используется только в моделях бурового станка модификаций 2 ÷ 6 СБШ - 200, изготовители: - Барвенковский машзавод «Красный луч» (Украина) и «БУЗУЛУКТЯЖМАШ» РФ. Вращение рабочего органа осуществляется от электродвигателя - 1, соединенного с помощью фланца с вращателем - 2, в котором перемещается пустотелый шестигранный шпиндель - 3 гидропатрона - 4. Через шпиндель - 3 гидропатрона проходит штанга - 5, которая при бурении зажимается тремя кулачками - 6, стальной траверса - 7, двух гидроцилиндров механизма подачи - 8. При разборке буровой став поднимается лебедкой с трехкратным полиспастом - 9.

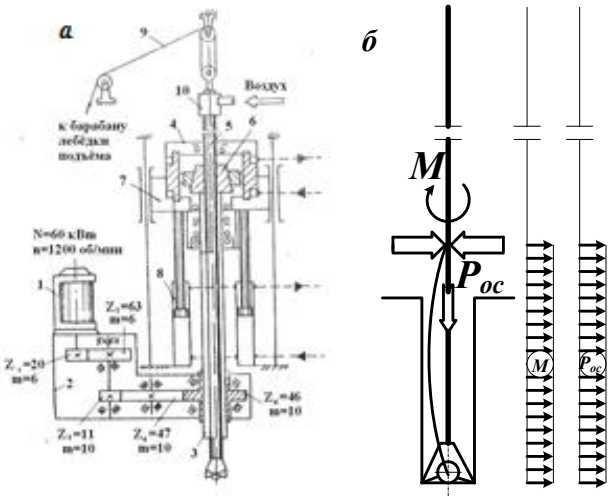

Рисунок 2. а - Кинематическая схема вращательно - подающего механизма станка 2СБШ - 200Н; б - Эпюры, действующих, на буровой став, крутящего момента и осевого усилия.

Преимущество патронной схемы:

- возможность загружать крутящим моментом, подводимым к долоту, только расположенную между вращателем и долотом нижнюю часть бурового става, что показывает благоприятное влияние на снижение крутильных колебаний става и каркаса мачты (см. рис. 2б);

- возможность не загружать верхнюю часть бурового става, расположенную между вращателем и вертлюгом - 10, осевым усилием, что повышает, жесткость подачи и снижает вибрации станка;

- снижение общей массы мачты и механизма ее опускания в транспортное положение;

- каркас мачты не нагружен кручением, поскольку реактивный момент от кручения не воспринимается направляющими мачты;

- при извлечении става из скважины в случае заклинивания долота, мачта не воспринимает сжимающих нагрузок.

Основным недостатком патронной схемы ВПМ буровых станков является малый ход подачи на забой (1м) и цикличность процесса бурения.

Роторный ВПМ имеют буровые станки моделей RO - 300, DM20 - SP, DM25 - SP, DM35 - SP фирмы «Ингерсолл - Ренд» (США), модели буровых станков БАШ - 250, БАШ - 320 конструкции института «Гипроникель» (Россия) и модель D400SP фирмы «Дрилтех» (США).

Вращение бурового става (рис. 3а) осуществляется ротором вращателя - 1, который передает крутящий момент профильной штанге - 6 бурового става. Последняя, получая вращение, имеет возможность непрерывно двигаться поступательно на всю свою длину посредством механизма подачи - 7.

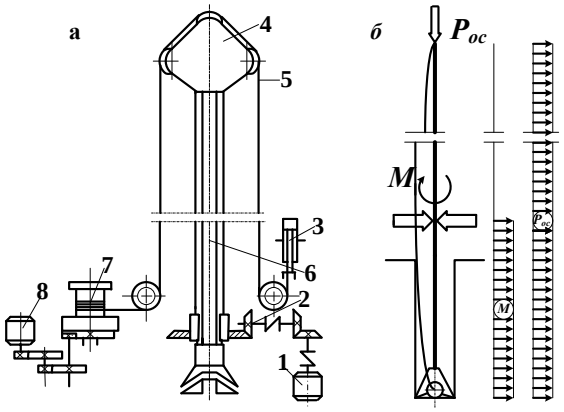

Рисунок 3. - а - Кинематическая схема вращательно - подающего механизма станка БАШ - 320; б - Эпюры, действующего на буровой став, крутящего момента и осевого усилия

1 - привод вращателя; 2 - редуктор вращателя; 3 - гидроцилиндр подачи; 4 - вертлюг; 5 - напорный трос; 6 - ведущая штанга; 7 - напорная лебедка; 8 - привод механизма подачи.

Преимущества ВПМ роторного типа соответствуют преимуществам ВПМ патронного типа. К недостаткам же этой схемы следует отнести нагруженность бурового става осевым усилием по всей его длине (см. рис. 3б) и невозможность его наращивания.

На устранение последнего недостатка роторной схемы ВПМ направлена схема ВПМ шпиндельного типа. Шпиндельная схема является самой распространенной схемой ВПМ ведущих мировых производителей буровых станков. К ним следует отнести буровые станки моделей 35 - R, 39 - R, 45 - R, 47 - R, 49 - R, 60 - R, 61 - R, 65 - R, 67 - R фирмы «Бюсайрус - Ири» (США). Буровые станки модели D45KS, D50KS, D60KS, D75KS, D90KS фирмы «Дирилтех» (США); буровые станки модели 70A, 100B, 100XP, 120A, 250XP фирмы «Харнишфегер» (США); буровые станки моделей HBM80, HBM90, HBM100, HBM210, HBM230, HBM250 фирмы «Хаусхерр» (ФРГ). Буровые станки моделей DM - 30, DM - 45, DM - M, DM - H фирмы «Ингерсолл Ренд» (США); буровые станки моделей GD - 60, GD - 90, GD - 100, GD - 110 фирмы «Гарднер - Денвер» (США), буровые станки моделей СБШ - 250, СБШ - 250МН, СБШ - 250 - 55, СБШ - 320 и СБШ - 250Д «РУДГОРМАШ» г. Воронеж (Россия).

Кинематическая схема вращательно - подающего механизма бурового станка СБШ - 320 приведена на рисунке 4а, б.

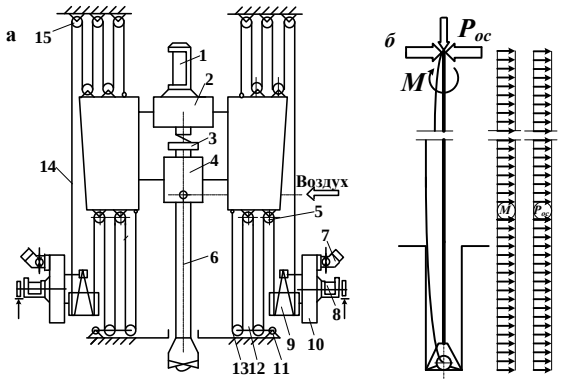

Рисунок 4. а - Кинематическая схема вращательно - подающего механизма СБШ - 320; б - Эпюры, действующих на буровой став, крутящего момента и осевого усилия

Буровой став вращается с помощью электродвигателя - 1 и коробки передач - 2, которая связана с опорным узлом - 4 и штангой - 6 через шинно-шлицевую муфту 3. Усилие подачи создается лебедками - 10 и передается на опорный узел - 4 через канат - 14, огибающий последовательно несколько раз приводные барабаны - 9 лебедок - 10. Тяговое усилие в канатах создается за счет их трения о барабаны. Натяжение сбегающих ветвей канатов при бурении создается весом буровой головки, а при подъеме става - натяжным устройством - 11 за счет веса рычагов - 12 и усилия пружин. Подача выполняется одним канатом, концы которого закреплены на правой и левой блочных обоймах опорного узла - 4, огибая последовательно блоки - 5, блоки - 13 натяжных устройств, барабаны - 9 лебедок - 10 и верхние блоки - 15. Канат образует четыре 5 - кратных полиспаста, два из которых расположены ниже головки бурового снаряда, два - выше. Привод лебедки - 10 осуществляется от гидромотора - 7 или от электродвигателя - 8. Гидромотор включают при бурении или извлечении прихваченного в скважине бурового инструмента, электродвигатель - 8 при спускоподъемных операциях.

Вращатели всех буровых станков по принципу действия одинаковы и состоят из гидравлического или электрического двигателя и редуктора, а ряд конструкций имеет выходное зубчатое колесо, которое скользит по шлицевому или профильному валу или его части. [3]

Механизмы подачи бурового става на забой и его подъема из скважины по передаче осевого усилия можно классифицировать следующим образом: - канатные механизмы подачи; - цепные механизмы подачи; - зубчато-реечные механизмы подачи, а по конструкции привода их можно разделить на:

- с приводом вращательного действия (барабанные или звездочные);

- с приводом поступательного действия (с силовыми гидроцилиндрами).

В свою очередь привод подачи вращательного действия может быть электрическим, гидравлическим и комбинированным, а силовые гидроцилиндры могут быть равно полостные с коэффициентом мультипликации - α_μ равным единице ($\alpha_\mu = 1{,}0$) и разно полостные с коэффициентом мультипликации - α_μ больше единицы ($\alpha_\mu > 1{,}0$).

С физической точки зрения процесс шарошечного бурения сводится к отделению и транспортированию разрушенной породы из забоя на поверхность уступа. Порода разрушается шарошками долота при вращении их по забою скважины. Разрушенная порода транспортируется из скважины на поверхность уступа сжатым воздухом.

Сложность определения усилий сопротивления, возникающих в механизмах вращения и подачи бурового инструмента, заключается в необходимости учета ряда факторов, влияющих на процесс разрушения и транспортирования породы при бурении. К числу таких факторов относятся: крепость породы; скорость подачи бурового инструмента на забой; частота вращения бурового инструмента; толщина снимаемой стружки; сила трения бурового инструмента и бурового става о породу и стенки скважины и др.

В качестве исходных для расчета величин обычно принимают коэффициент крепости породы по шкале проф. М.М. Протодьяконова, - f, диаметр долота - D, механическую скорость бурения - $V_б$, частоту вращения рабочего инструмента - ω, максимальную глубину бурения - L.

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Отечественная промышленность выпускает 13 типов трех шарошечных долот. Каждый тип долота предназначен для бурения пород определенной крепости. Зубчатые долота применяются для бурения мягких, средних и

твердых пород. В зависимости от твердости пород изменяют геометрическую форму шарошек и их вооружение. Статистическая обработка параметров отечественных и зарубежных трех шарошечных долот (допустимых осевых усилий [*F*], и чисел оборотов - *n* обеспечивающих их расчетную долговечность), а также учет рекомендаций ряда зарубежных фирм изготовителей долот позволила нам систематизировать рациональные силовые и кинематические параметры долот в зависимости от их диаметра в диапазоне крепости буримых пород по М.М. Протодьяконов от f_1 = 6 - 8 до f_2 = 20 (табл. 1).

Причем f_2 определяется по формуле:

$$f_2 = \frac{14{,}28[F]}{D_i}, \qquad (2.8)$$

Анализ приведенных в табл. 1. данных показывает, что размерный ряд долот диаметром от 160 мм до 400 мм целесообразно подразделить на четыре группы: 1 - я группа от 160 мм до 200 мм; 2 - я группа от 200 до 250 мм; 3 - я группа от 251 до 320 мм и 4 - я группа от 320 до 400 мм.

Таблица 1.

Тип и размер станка	**ПАРАМЕТРЫ**			
	диаметр долота D_i, мм	**допустимое осевое усилие [*F*], кН**	**число оборотов долота [*n*] при усилии [*F*], об/мин.**	**крепость породы максимальная / минимальная f_2 / f_1**
СБШ 200	**160/169 * 184* 200**	**135 160 200**	**80 75 70**	**11.4/6…8 12.4/6…8 14.28/6…8**
СБШ 250	**200 229* 249,9/251***	**200 250 280**	**70 65 60**	**14.28/6…8 15.7/6…8 16.0/6…8**
СБШ 270 СБШ 320	**249,9/251 269,9 311*/320**	**280 325 400**	**60 55 50**	**16.0/8…10 17.25/8…10 18.4/8…10**
*** - американский стандарт.**				

Полагаем, что силовая установка каждого из трех рассмотренных нами выше типов станков упомянутых в табл. 1, должна обеспечить необходимые усилия подачи для максимального диаметра, а частоту вращения, равную двойной частоте вращения для минимального диаметра бурения.

Технология бурения взрывной скважины определяет последовательность выполнения операций, обеспечивающих процесс образования скважин. При обуривании породного массива выполняются следующие операции: - установка станка на заданной отметке; - непосредственно бурение (в случае необходимости наращивание бурового става по мере углубления скважины); - разборка бурового става; - замена изношенного инструмента; - перемещение станка к отметке следующей скважины.

При принятой технологии бурения, время затрачиваемое, на бурение одной скважины считаем, элементарным циклом работы всех механизмов бурового станка.

В зависимости от конструктивного исполнения ВПМ и мачты бурового станка можно выделить два вида элементарного цикла бурения одной скважины различной структуры:

- цикл, при котором, буровой станок имеет ход непрерывной подачи - L_X больший глубины скважины - L_H; $L_X > L_H$ (1.1)

- цикл, при котором, буровой станок имеет ход непрерывной подачи - L_X меньший глубины скважины - L_H: $L_X < L_H$ (1.2)

Технология выполнения буровой скважины, отвечающая условию - (1.1) в технической литературе носит название **«синглпас»**, а условно - (1.2) **«синглпас плюс один»** или **«малтипас».**

Структура элементарного цикла обуривания породного массива для технологии, **«малтипас»** приведенной на рисунке 5 включает:

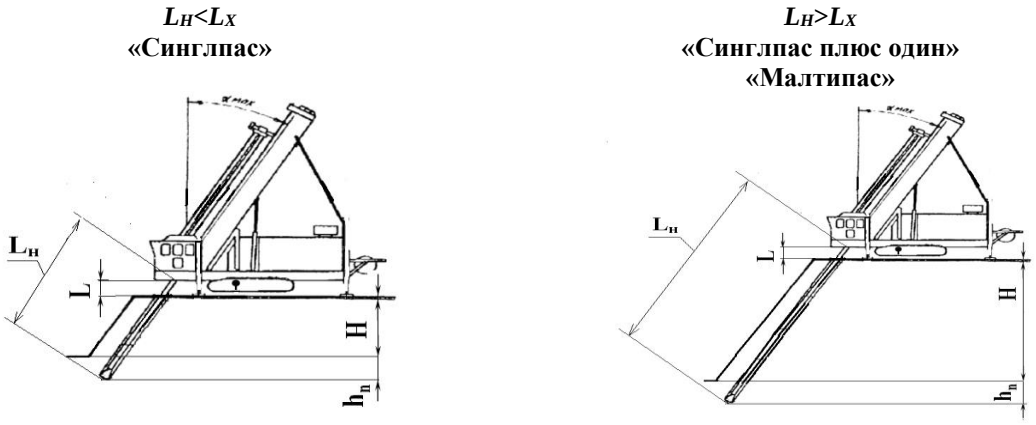

Рисунок 5. - Технология проходки одной взрывной скважины

- τ_1 - длительность работы системы горизонтирования станка, с, равная $0{,}03\,T_ц$ [2];

- τ_2, - длительность развинчивания (свинчивания) стыка штанг, с, равная $0{,}03\,T_ц$ [2];.

Как свидетельствует опыт эксплуатации отечественных и зарубежных буровых станков [4,9] режим работы приводов механизма горизонтирования и вращателя «свинчивание - развенчивание» является, кратковременным и составляет, от 0,3% до 1,0% времени от длительности цикла, причем меньшее его значение соответствует бурению крепких пород, а большее средних и мягких пород. [7,8]

Соответственно, длительность элементарного цикла - $T_ц$ для бурового станка обуревающего породный массив по технологии **«малтипас»** определится как:

$$T_ц = \sum_{1}^{n} \tau_i \text{ ,с , } i = 1,2,\ldots \quad ,n \qquad (1.3)$$

где τ_3 - длительность непрерывного бурения одной штангой, с

$$\tau_3 = L_H / V_б \text{ , с} \qquad (1.4)$$

Здесь $V_б$ - скорость бурения, м/с;

τ_4 - длительность подъема бурового става (байпас), с

$$\tau_4 = L_x / k_v V_{бп} \text{ , с} \qquad (1.5)$$

здесь $V_{бп}$ - максимальная скорость подъема бурового става из скважин, равная 0,466 м/с [4,8];

k_v - коэффициент использования скорости подъема става (0,4 - 0,5) [4];

τ_5 - время передвижения станка от скважины к скважине, с.

$$\tau_5 = \frac{k_u \left(a_c^2 + в^2\right)^{0,5}}{k_{v1} V_x} \text{ , с} \qquad (1.6)$$

где k_u - коэффициент использования траектории движения для обуривания первого ряда равен $\sqrt{2}$, а для обуривания второго и последующих рядов при многорядном взрывании равный 0,5;

a_c - расстояние между скважинами в ряду, м;

$в$ - расстояние между рядами скважин при многорядном взрывании, м;

k_{v1} - коэффициент использования скорости движения станка, равный 0,3 [4,7];

V_x - скорость передвижения станка от скважины к скважине, м/с, V_x = 0,33м/с [4,7,8,9];

$n_ш$ - число штанг, шт;

$\tau_{пш}$ и $\tau_{ош}$ - длительность, соответственно быстрого подъема (опускания) шпинделя определяется по формуле (1.6) при k_v = 0,7 - 0,8, с.

Таким образом, длительность элементарного цикла - $T_ц$ для бурового станка СБШ - 200 обуривающего породный массив по технологии **«малтипас»** с учетом выражений (1.4), (1.5) и (1.6) окончательно составит:

$$T_ц = \tau_1 + \tau_2 + L_H / V_б + \frac{L_x}{k_v V_{бп}} + \frac{k_u \left(a_c^2 + в^2\right)^{0,5}}{k_{v1} V_x} \text{ , с} \qquad (1.7)$$

Весовые коэффициенты - $\Psi_{цi}$, отражающие относительную продолжительность активации приводов системы горизонтирования, подачи, вращения долота, очистки скважины и хода при обуривании породного массива соответственно составят:

- для работы системы горизонтирования станка; [1,2,3,4,5,6]

$$\psi_{ц1} = 0{,}03 / T_ц \qquad (1.8)$$

- для работы ВПМ при развенчивании (свинчивании) стыка штанг [2];

$$\psi_{ц2} = 0{,}03 / T_ц \text{ ,} \qquad (1.9)$$

- для работы ВПМ при непрерывном бурении одной штангой;

$$\psi_{ц3} = L_H / V_б T_ц \qquad (1.10)$$

- для работы ВПМ при подъеме бурового става (байпасный режим);

$$\psi_{ц4} = L_x / k_v V_{бп} T_ц \qquad (1.11)$$

- при передвижении станка от скважины к скважине

$$\psi_{ц5} = \frac{k_u \left(a_c^2 + в^2\right)^{0,5}}{k_{v1} V_x T_ц} \qquad (1.12)$$

Для отработки уступов высотой - H (как правило, 10; 15 и 20 м) буровой станок должен

обеспечить бурение взрывной скважины с глубиной равной:

$$L = (L + H + h_n)/\cos\alpha \text{, м} \qquad (1.13)$$

где L - расстояние между долотом и устьем скважины (при максимально поднятом вверх буровом ставе), м;

H - высота уступа, м;

h_n - длина перебура, м;

α – максимальный угол наклона скважин к вертикали, град.

Далее, в соответствии с результатами, полученными в [4] момент вращения долота - M определяется зависимостью (рис. 6а):

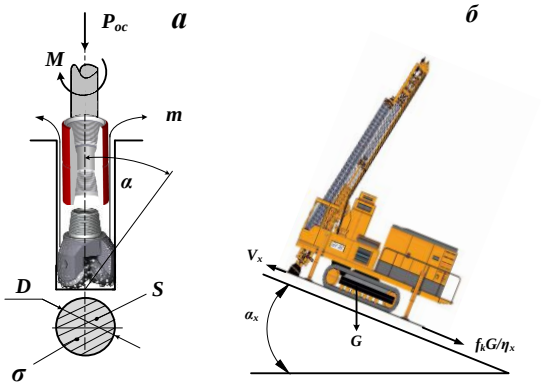

Рисунок 6. - Силовые параметры нагружения основных механизмов бурового станка: а - при бурении; б - при перемещении от скважины к скважине

$$M = 2{,}84\cdot 10^{-3} k_1 K_c D(0.22 P_{ос})^m \text{, Нм} \qquad (1.14)$$

Здесь, m - показатель степени, зависящий от качества очистки скважины (при очень хорошей продувке - m = 1,25; при удовлетворительной - m = 1,5; при плохой продувке - m = 1,75)

k_1- коэффициент, зависящий от прочности - σ буримой породы;

K_c - коэффициент, учитывающий увеличение момента от угла отклонения оси скважины от вертикали - α [5,6,7].

Зависимость коэффициента k_1 от прочности буримой породы [4].

В свою очередь условия осуществления бурения с учетом эффекта конверсии колебаний* можно записать следующим образом:

$$P_{ос} \geq 0{,}25\pi\sigma D^2 k_{дп} \text{, Н} \qquad (1.15)$$

$$M \geq 2{,}84\cdot 10^{-3} k_1 K_c D(0.22 P_{ос} k_{дп})^m k_{двр} \text{, Н/м} \qquad (1.16)$$

где $k_{двр}$, $k_{дп}$ - коэффициенты динамичности нагрузки вращателя и системы подачи бурового станка, соответственно.

* Когда приводы вращения и подачи бурового станка одновременно действует на долото возникает эффект конверсии. Под эффектом конверсии понимается процесс возникновения вынужденных колебаний в приводе вращения долота за счет собственных колебаний привода системы подачи. [1,2,3,4,8]

Мощность ВПМ с учетом (1.13) и (1.15) определится следующим образом:

$$\begin{cases} N_n = 0{,}25\pi\sigma D^2 k_{дп} V_б \\ N_{вр} = 2.84\cdot 10^{-3} k_1 K_c (0{,}22 P_{ос} k_{дп})^m D^{m+3} \omega_{вр} k_{двр} \end{cases} \text{Вт} \qquad (1.17)$$

где N_n, $N_{вр}$ - мощность привода системы подачи и вращения бурового станка, соответственно, Вт.

Мощность привода компрессора, необходимая для очистки скважина от буровой мелочи в соответствии с результатами, полученными в работе [6] составляет:

$$N_к = 0{,}125\pi\rho g k_p \frac{H}{\eta_n \eta_к \cos\alpha} D^2 V_б \text{, Вт} \qquad (1.18)$$

где: k_p - коэффициент разрыхления буримой породы, k_p =1,45÷1,65 [4,7,9];

α - угол наклона взрывной скважины к вертикали, рад.

Выводы.

Таким образом, силовые установки рассмотренных трех конструктивных схем ВМП, должна обеспечить необходимые усилия подачи для максимального диаметра, а частоту вращения, равную двойной частоте вращения для минимального диаметра бурения. Для оптимально выбора долота для каждой схемы выполнен анализ размерного ряда долот и сведены в таблицу 1 с подразделением на четыре группы. По результатам исследований определённые формулы нескольких параметрических величин вращательно-подающего механизма бурового станка зависящий от весового коэффициента и элементарного цикла бурения по технологии «синглпас» и «малтипас».

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QR – Issue QR – Article

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PROCESSES REFLECTING THE PECULIAR UNIQUE TRADITIONALISM OF THE VILLAGES OF BOYSUN

Abstract: *The article describes how the ancestors of the population of Baysun villages led a peculiar life, long adapting to the socio-economic conditions of the region, describes the important role of natural and geographical conditions in the conduct of their economic activities, and how significant was the level of socio-economic development of that period. It was also noted that the population of the Baysun villages productively used the methods of irrigation and rainfed cultivation (lalmikor) in irrigation and agriculture in the foothills and hilly areas.*

Key words: *population, ethnos, ethnic group, kishlak, settlement, place of residence, city, river, economic activity, agriculture, animal husbandry, crafts, gardening, trade, ceremonies, customs and traditions.*

Language: *Russian*

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Scopus ASCC: *1202.*

ПРОЦЕССЫ, ОТРАЖАЮЩИЕ СВОЕОБРАЗНЫЙ УНИКАЛЬНЫЙ ТРАДИЦИОНАЛИЗМ КИШЛАКОВ БАЙСУНА

Аннотация: *В статье рассказывается о том, как предки населения кишлаков Байсуна вели своеобразную жизнь, издавна адаптируясь к социально-экономическим условиям региона, описывается важная роль природно-географических условий в ведении их хозяйственной деятельности, и насколько значительным был уровень социально-экономического развития того периода. Также было отмечено, что население кишлаков Байсуна продуктивно использовали методы полива и богарного выращивания (лалмикор) в орошении и сельском хозяйстве в предгорных и холмистых местностях.*

Ключевые слова: *население, этнос, этническая группа, кишлак, поселение, место жительства, город, река, хозяйственная деятельность, земледелие, животноводство, ремесла, садоводство, торговля, церемонии, обычаи и традиции.*

Родина – это не только место, где я родился, но и то место, где я рос, где я играл и был счастлив.
Сидки Хондойлики

Введение

Кишлаки Байсуна в основном состоят из местностей, где население занимается сельским хозяйством, животноводством и другими видами сельского хозяйства. Повседневная деятельность населения, проживающего в этих кишлаках, связана не только с ними, но и отличается от города в социально-экономическом, культурном, природно-географическом аспектах, и по образу жизни. Кишлак - это самое низшее звено в административно-территориальной системе Республики Узбекистан, социально-экономические характеристики кишлака неразрывно связаны с тем, каким образом население использует земли, с природными и географическими условиями местности. Следовательно, кишлаки исторически были большими и маленькими. Места проживания также располагались в соответствии с этим. На равнинных местах с изобилием влаги и

плодородной землей, в общем, на территориях с удобными природными условиями располагались крупные кишлаки, где население было довольно плотным, и жители занимались в основном земледелием и садоводством. Например, кишлаки Авлод, Сариосиё, Пасурхи, Дарбанд, Работ, Чиланзар, Дахнаиджом, Тиллокамар, Ходжабулган, Мунчок, Сайроб, Пулхок и другие [6.]. В равнинных районах, где было мало воды (пустынях и степях), население чаще занималось животноводством. В таких местах кишлаки были небольшими, и располагались далеко друг от друга, в основном у колодцев: Аджрим, Кучкак, Тангимуш, Кофрун, Ходжадияк, Шураб, Фотмабулак, Питов, Ёмчи, Узун Кудук, Бешеркак, Пенджаб, Ортабоз, Инкабод, Даштигоз, Кокбели и другие. В горных местностях кишлаки в основном располагались вдоль рек и родников: Туда, Хомкон, Назари, Олачопон, Яккатол, Гуматак, Дехиболо, Курганча, Дуоба, Сайрок, Кентала, Кизилнавур, Мачай, Ёлгизбулак, Окджар, Миркоракоз, Сарикамыш, Пудина, Омонхона, Кошбулак, Чаган, Сели-бели, Эгарчи, Урикли, Акбулак и другие [7.].

Основное население расположенного в бассейне Байсундарьи города Байсун и 14-ти кишлаков, соседних с ним, составляли таджикские чигатаи. Город Байсун расположен в промежутке между горными скалами русла небольшой горной реки. На основном участке бассейна реки, отделенном от скал, находятся кишлаки Авлод, Сариасия, Кучкак, а остальные кишлаки расположены вдоль двух каналов, отведенных из реки.

Канал Пасурхи протекает через села Пасурхи, Курганча, Карабойин, Бибиширин, Миркоракоз, расположенные на правом берегу реки, а канал Шойит служил для полива в кишлаках Шойит, Богибало, Чинор, Кизилкорез, Пойгабоши, Кокчи, Шурсай, Газа, расположенных вдоль левого берега реки. В селах Бибиширин, Кучкак, Богибало, Чинор ва Кукчи в основном проживали таджики-чигатаи. В селах Авлод, Пасурхи. кроме таджикских худжа и таджиков-чигатаев, проживали также узбеки-токчи. В кишлаках Шойит, Газа, Пойгабоши, Шурсай, Карабойин таджики-чигатаи проживали вместе с узбеками-кунгратами [8.52-53].

В верховьях реки Халкаёр (эта река также называлась Ходжаипок) проживали турки. В кишлаках Саройтош, Турк, в кишлаках Алчабулак и Турк около местности Инкабод, в кишлаках Юкори Мачай и Каттакишлок в бассейне реки Мачай также жили турки [9]. Издревле коренным населением Байсунского бекства считались турки, которые были известны также как «горные турки», поскольку в основном проживали в предгорных и горных территориях [10.190]. Известный ученый этнограф Б.Х. Кармишева также изучала турков, живущих в этих горных кишлаках [11.72].

Также, в кишлаках Кизилнавур, Кентала, Авлод, Курганча, Сариасия проживают горцы-катаганы [12.15].

Кунграты проживали в селах Ходжабулган, Дахнаиджом, Шураб, Сариасия, Тура, Ходжабулган Байсунского района [12.15].

В настоящее время кишлаки района объединены в сельские советы и махалли. Исторически объединение махаллей в один кишлак было связано с тем, что их население занималось определенным видом земледелия, они принадлежали к одному племени, пили воду из одной реки, вместе проводили хашары, свадьбы и поминки. Кишлак это социально и исторически сложившееся единство людей. Их возникновение связано с развитием общества, и с изменениями в региональном распределении труда. Но в связи с увеличением численности городского населения и урбанизацией, миграция оказала значительное влияние на уровень численности населения некоторых сел Байсунского района. Например, в 1920-е годы XX века в Байсунском районе было 201 кишлаков, а к 1935 году - 165 кишлаков. В 2009 году люди жили в 72 кишлаках [13]. Численность населения в сельской местности в последние годы увеличивалась, это связано с относительно высокой рождаемостью и проживанием большинства семей в сельской местности. Древние кишлаки состояли из сезонных поселений. Кишлаки изначально возникали как места, где люди жили в зимний период. Люди постепенно переходили на оседлый образ жизни, занимаясь сельским хозяйством.

Сформировавшиеся в период первобытного общества родовые объединения сохранялись даже в период оседлой жизни, один род селился в одном кишлаке. Например, в Байсуне кишлак Карабойин был центром притяжения кунгратов. Также возникали кишлаки на караванных путях и речных переправах, например, Дарбанд, Работ, Окджар, Кайрок (улоқ-ўйнар) и другие. Затем, по мере развития ремесел и торговли, с началом отделения сельского хозяйства стали возникать города. Вначале кишлаки управлялись лидерами общины, затем избираемыми старейшинами общины, либо собранием всей общины. Внешний вид кишлаков изменялся с течением времени. На территории Байсуна были кишлаки, образовавшиеся в X-XIIИ веках, такие как Мунчоктепа, Бозортепа, Хисортепа, Окджар, Кургани боло, Октепа, Тора, Гиштепа, Кофрун. Согласно историческим источникам, угасание этих сел приходится на период нашествия Чингисхана. Во времена Тимуридов жизнь в этих кишлаках снова оживилась. Источники XIX века утверждают, что население Байсуна составляло 5 тыс. человек. По данным на 2004 год, 63,5%

населения Узбекистана проживало в сельской местности. Этот показатель в Великобритании составляет 11 процентов, в Германии - 12 процентов, и в США - около 21 процента.

Пасурхи – кишлак, расположенный на территории «схода сельских граждан» “Работ”. Население занимается животноводством, сельским хозяйством, садоводством и виноградарством. Из местных сортов винограда очень хороши и сладки «тайфи», «песабанд», «джовуз». Проживающие в нем люди - деловые и предприимчивые. Население плотное. Кишлак получает воду из Байсунсая (Хангаронсай). Жители обеспечиваются водой, привозимой в виде родниковой воды, доставляемой в кишлак Тода по водопроводу. Пасурхи - низкий Сурхи (нижний Сурхи), слово Сурхи - это персидское название красноватого холма. Некоторые люди понимают это название как «обратная сторона красной возвышенности».

“Авлод” - кишлак на территории «схода сельских граждан»…. В основном там живут таджики-чигатаи. Население занимается животноводством, пчеловодством, земледелием, садоводством, овощеводством. Местные красные яблоки «Байсун» очень хорошие и сладкие.

Кишлак Кизилнавур расположен на левом берегу реки Мачайдарьи, и его основное население составляют горцы-катаганы, хозяйственная деятельность которых в основном является богарным земледелием и животноводством. Садоводство менее развито, так как на богарных землях сеют ячмень и пшеницу. Ячмень растет на поливных землях, его поливали родниковой водой и культивировали. В животноводстве лошади (кони) являются основным направлением, так же пасут коз, но больше овец и крупного рогатого скота, этот скот в основном пасется на пастбищах Урикли и Джобаяк. В ремесленничестве было много мастеров, делающих плуги, хомуты, седла, мастеров-ювелиров, а также делающих халажи и точилки. Женщины ткали ковры из различных разновидностей хлопка и шерсти, имевшие различные названия, такие, как хаджари, чумчуккуз, такыр.

Кишлак Мачай расположен верховьях Шерабаддарьи, а часть Шерабаддарьи до кишлака Мачай так и называется - Мачайдарья. Ранее Мачайдарья называлась река Турхан (Турган).

Кишлак Мачай разделен на три части: кишлаки Верхний Мачай, Средний Мачай и Нижний Мачай. Между кишлаками Верхний Мачай и Средний Мачай находится знаменитая пещера Тешикташ.

Во всех трех кишлаках проживают узбекские кенагасы, барлосы, турки, хардури, и частично иранцы. Основными видами хозяйственной деятельности являются земледелие и животноводство, в этом земледелии пшеница, ячмень и лен выращиваются на богарных землях. Здесь проводились связанные с сельским хозяйством обряды «Дарвешона» и «Козон тулди». В животноводстве в основном выращивают овец, коз, частично лошадей и крупный рогатый скот. Овечья и козья шерсть, а в последние годы также хлопковолокно использовались для изготовления ковров и войлока различных размеров и видов, таких как ковры Годжари, Кочкормайиз, Имомсултони, Аждар гилам, некоторые из которых выставлялись на продажу. Из ремесел хорошо развито столярное дело. Мастер-плотник Туроббой делал различные предметы с резьбой по дереву: узорные сундуки, барабаны думбира, халажи, точилки и другие предметы первой необходимости. Традиционные блюда: шурпа, кайнатма, плов, шавля, куртоба, ширингуруч, плов из пшеничной крупы.

В заключение можно сказать, что жители кишлаков Байсуна в своей уникальной своеобразной культуре, благодаря своему образу жизни и традициям, сохраняют принципы этнического своеобразия и идентичности наряду с общностью всей нации. Развитие любого общества непосредственно зависит от позитивного взаимодействия между этническими группами, а национальное единство и целостность напрямую связаны с этими факторами.

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EFFECTIVENESS OF FIRST LANGUAGE IN ACQUISITION OF SECOND LANGUAGE

Abstract: *In teaching Russian languages to engineering students, L1 is a key to acquire second language because full understanding linguistics aspects of L1 enable learners to better understand L2. Without intervention of L1 in teaching second language, effect will be less, consequently, we should explain translation of L2 in native language (Uzbek) in details, otherwise, acquisition of second language may be complex, long, and misunderstanding. Besides, second language vocabulary acquisition is highly concerned in learning a language. This paper deals with the issues focusing on the some features of instructions to learn second language with the help of L1. Some scholars stated their expressions on vocabulary acquisition in second language learning and its beneficial traits.*

Key words: *engineering students, Russian, Uzbek language, teaching languages.*

Language: *English*

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Introduction

Language acquisition is one of the most important and fascinating aspects of human development. There are various subconscious aspects of language development such as met linguistic, conscious, formal teaching of language and acquisition of the written system of language in both L1 and L2. Various language variables are involved in the language processes like phonology, vocabulary, morphology, syntax, paralinguistic, pragmatics and discourse. In order to provide success in cognitive functioning as well as professional life of an individual, his/her first language acquisition must develop strongly in the early years. The characteristics of language learning entails the successful mastery of steadily accumulating structural entities and organizing this knowledge into coherent structures which lead to effective communication in the target language if this is the case, than we would expect that well-formed accurate and complete target language structures would one after another, emerge on the learner's path towards eventual mastery of the language. Second language learners appear to accumulate structural entities of the target language but demonstrate difficulty in organizing this knowledge in appropriate, coherent structures. There appears to be a significant gap between the accumulation and the organization of the knowledge. Moreover, in teaching and learning second language, we often encounter with unavoidable technical language which is difficult to paraphrase and guess, therefore, our learners should learn vocabulary in order to express his/her ideas by extending their horizons of knowledge in engineering in Russian language.

Acquisition of linguistic skills through interference of L1

When reading and writing and speaking the target language (L 2), second language learners tend to rely on their native language (L 1) structures to

produce a response. If the structures of the two languages are distinctly different, then one could expect relatively high frequently of errors to occur in L2, thus indicating an interference of L1 on L2 [2]. Furthermore, extensive research has already been done in the area of native language interference on the target language. Dulay [1] defined interference as the automatic transfer, due to habit, of the surface structure of the first language onto surface of the target language but Lott[3,265] stated that interference as "errors «in the learner's use of the language that can be traced back to the mother tongue. Ellis [2,51] refers to interference as "transfer", he stated that the influence that the learner's L1 exerts over the acquisition of an L2. He argued that the transfer is governed by learners' perceptions what is transferable and by their stage of development in L2 learning. In learning a target language, learners instruct their own intern rules with the use of their L1 knowledge, but only when they believe it will help them in the learning task or when they have become sufficiently proficient in the L2 for transfer to be possible.

Ellis raises the need to distinguish between errors and mistakes and makes an important distinction between the two. He says that errors reflect gaps in the learner's knowledge; they occur because the learner does not what is correct. Mistakes reflect occasional lapses in performance; they occur because in a particular instance, the learner is unable to perform what he or she knows. It appears much more difficult for an adult to learn a second language system that is as well learned as the first language. Thomas [9] argued that we should try to understand how people communicate effectively with the linguistic resources available to them.

Ellis [5] also points to the fact that explicit instruction improves the speed of acquisition , the need for input in L2 acquisition has been recognized widely, and that the input that learners are receiving in the form of their L2 instruction has significant effects on their learning asset.

The National Reading Panel [6] concluded that a combination of both direct and indirect methods is the best method for teaching vocabulary; direct instruction, which promotes word consciousness, involves a focus on roots and affixes, word play, and word orders. It is also believed that restructuring tasks and recycling new vocabulary throughout the course enhances vocabulary development. Graves[8] also advocates a kind of fostering word consciousness. Stahl [7] stated that vocabulary instruction must include both definitional and contextual information regarding the meaning of each word.

Texas Reading Initiative [10] suggests using descriptions, interesting metaphors, similes, and plays on words, and explaining the contexts of use to be useful techniques of consciousness-raising when teaching new words.

Mastering second language

Nunan [4] found that language use opportunities and successful communication are dependent upon the mastery of L2 vocabulary. Therefore, pupils should learn and acquire a sufficient amount of vocabulary to fully engage in verbal communication. The communicative process of negotiation promotes second language comprehension and the type of task that is normally involved emulates the information gap format to push learners to communicate in classrooms. Additionally, it has also been suggested that negotiated interaction promotes L2 vocabulary acquisition in terms of retention; whereby language learners will have to ability to hold the vocabulary for short-term and long-term retrieval in their memories – with particular reference to nouns. While translating authentic texts in classes, we use L1 knowledge which improves the comprehension skills of learners. For example, for the students in the field of agriculture:

Чтобы получить хороший урожай нужно правильно выбрать семена хлопчатника. Мы посияем семена хлопчатника непосредственно на поле специальными посевными машинами. Эти машины вырывают небольшие траншеи (определенной глубины) для семян, бросают семена внутрь с определенными расстояниями между ними, а затем слегка присыпают почвой.

Yaxshi xosil olish uchun biz paxta urug'ini to'g'ri tanlashingiz kerak. Paxta chigitini to'g'ridan-to'g'ri dalaga maxsus sepish mashinalari bilan sepamiz. Ushbu mashinalar urug'lar uchun kichik xandaqlarni (ma'lum bir chuqurlikda) qazishadi, urug'larni orasidagi masofalar bilan ichkariga tashlaydi va keyin ularni tuproq bilan ozgina changlatadi.

Learners in the field of agriculture may undersatand above-mentioned context if they have enough background increasing vocabulary knowldge in Russian and Uzbek language. Agriculture is highly developed sector in our country and laerners from the areas where they cultivate wheat or other plants could understand the essense of the context with the help of prior experience.

Conclusion

Teaching languages to engineering students is not easy but complex, and long-learning process because they do not only learn language but also subject matter in L2. Teaching Russian language for specific purposes mainly is content-based, we often teach them authentic context both in written and spoken forms so as enable them better acquire L2. However, they sometimes encounter with issues while reading contexts, not having enough knowledge in L1, that's why we often use L1 in order to introduce them new data about their specialty. Therefore, native language is essential in acquisition of second language

in language classes. More practice may gave them more meaning in engineering in L1 and L2.

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POETESS KHALIM KHUDOYBERDIEVA AND HIS SKILL IN USE OF THE WORD

Abstract: *World experience shows that the study of the social nature of any language is the right way to begin with the study of individual speech. This is a complex and at the same time comprehensive process of linguopersonological analysis, the study of which, the separate application of linguistics as a field of personal speech, social, is one of the most pressing problems of Uzbek linguistics today.*

While the identification of the linguo-poetic possibilities of language means requires reliance on literary texts, the analysis of the works of a number of poets and writers, research can also serve to demonstrate the possibilities of the Uzbek language and its verbal expression. It should be noted that the life and poetry of the poetess Halima Khudoiberdieva are a great legacy. In our science, there is a need to study the specific features of this heritage from a linguopoetic point of view.

The article aims to show the diversity of the linguistic landscape of the world in the poetics of the poet by drawing lines on the life and career of Halima Khudoiberdieva.

Key words: *words and poetry, language and literature, word usage, strong creation.*

Language: *English*

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Introduction

The poem is the poet himself. (Ibrahim Gafurov)

In this enlightened world there are many poems and many poets. But there are few real poets who shine, and few original poems that will not leave you indifferent. Indeed, in fiction there is a golden rule: when emotions are deep, a real work is created. The work of Halima Khudoiberdiyeva is filled with tender feelings, a proud "I", real patriotism, unrestrained love for mother and people, honesty, anthropology, femininity, deep philosophy, a wise worldview, writing the truth. The differences from ordinary people, such as fearlessness, are many and deep.

In fact, the life of Halima Khudoiberdiyeva is similar to the life of ordinary intellectuals. But is it?!

Halima Khudoyberdiyeva was born on May 17, 1947 in the Boyevut district of the Syrdarya region in the family of Ummatkul Khudoyberdi oglu and Shafoat Hannazar kyzy. The mother of the future poet died when she was two years old, and her aunt Karshigul Hannazar adopted her.

The first poems of Halima Khudoiberdiyeva were published in the regional newspaper when she was in the 7th grade. Later, his work began to appear in the regional newspaper. The student's creativity gradually began to appear on the pages of the regional newspaper. Abdukholik Abdurazzakov, a contemporary of Halima Khudoyberdyeva, an honored journalist of Uzbekistan, later told about that time: His works were published in the Syrdarya newspaper "Syrdarya Khakikati". Halima-opa was an active member of the literary circle organized by our literature teacher Mirzabek Mirzakulov, who was also a good poet [5]".

Schoolgirl Halima, well-known in the regional press, attracted the attention of the head of the republic, Sharof Rashidov, who was on a business trip

to Syrdarya*. The poetess recalled: "After reading my poems, Sharof Rashidov called a man named Nosir Makhmudovich, the then governor of Syrdarya:" This talented girl needs to be paid attention to, in the future she will read Talk to the girl's parents ". I remember that after that the governor of the region, Nosir Makhmudovich, came to our house and talked to his father. And so I came to study in Tashkent, otherwise girls at that time would not have been sent to study in our country" [3].

The young poet will come to study in Tashkent with the attention of the President. From 1968 to 1972 he studied at the Faculty of Journalism of the Tashkent State University (now the National University of Uzbekistan). In the first year of study, the first collection of poems by the young poet "First Love" was published. The poet recalls his first great success as follows: "This book was received with such love that I am grateful to my fans, especially teachers at the university. They praise me for adding ten achievements to one of my achievements, and sometimes during exams I read a poem by Rasul Khamzatov, Silva Kaputikyan, Eduard Mezhelaitis or Bella Akhmadullina (I must have memorized the Uzbek translation) and put it in my examination book. I was pleased with the "5" grade" [3].

After all, the success of the young poet: "At the end of the sixties, Halima Khudoiberdieva from Boevut, Tashkent region, entered the literary world like a deer. His gait and demeanor were like those of a deer. His courage was as strong as that of a bull. He read poetry like a white apple tree with a new flower and fresh fruit. Fans of the poem immediately heard his voice. The first to hear this voice was the great poet Zulfiyahanim. He embraced the new voice with open arms and blessed him, wishing him a safe journey on creativity. Together with Zulfiya, Halima Khudoiberdyeva was greeted by great literature and a great generation," Ibragim Gafurov wrote [2].

After graduation, she began working as a literary worker for the Saodat magazine, which regularly publishes her beautiful poems. Halima Khudoyberdieva, whose poems have already found fans, worked in the republican women's magazine, first as a literary worker, and then (until 1975) as a department head. During these years, the poet published two more poetry collections - "White Apples" (1973) and "Chaman" (1974). The works of Halima Khudoiberdiyeva, who stole the peace of poets and won their hearts, naturally spread throughout the republic. He was popularly known as "Uzbek Halimasi"; Halima Khudoiberdieva, along with Nodira, Uvaysi, Anbar Otin, Dilshodi Barno and Zulfiya Khanum, was included in the list of Uzbek folk poets at official and unofficial meetings.

The poetess wrote:

Men shunchaki o'ylagim kelmas,
Xayol – sharob misol qilsin sarxush, mast.
Men shunchaki kuylagim kelmas,
Ovoz pardalarim chidab bersa bas–

Excited by these verses, the great literary critic Tokhtasin Jalolov wrote an article entitled "On the Rise of Emotions" and said: "Halima is an unexpected phenomenon in Uzbek women's poetry, before that there was a kind of peace and quiet in the house of art. Halima burst in and began to sing loudly" [5].

As one of the editors of the magazine, he constantly searched for readers of the "Saodat" magazine in different regions, districts and villages of the republic. He wrote about them sometimes as a journalist, sometimes as a publicist. Although the poet held various positions in public life, she was not distracted from poetry for a second.

In 1975, the poet went to Moscow for the Maxim Gorky Higher Literary Courses to learn more about poetry and the secrets of fiction. These two years in Moscow brought the young Uzbek poet closer to the masterpieces of world literature. The poet confesses in his memoirs: "The last two years have been irreplaceable. Moscow gave me so much. There I went into world literature ... The spirit of the poems written then was different" [6].

The poet's collections My Supporting Mountains (1976) and Grandfather's Sun (1977) were created during the Higher Literary Course and became available to poetry lovers. From this period his effective work as a translator began. The translations of Halima Khudoiberdiyeva from the works of Fazu Aliyeva, Silva Kaputikyan, Ibragim Yusupov always attract attention.

Halima Khudoiberdieva was the head of the publishing house in 1978-1982, the deputy editor-in-chief of the Saodat magazine in 1983-1985 and the editor-in-chief of the Saodat magazine in 1985-1994. (Halima Khudoyberdieva was the editor of Saodat fifteen years after Zulfiya Isroilova.) At the same time, the poet was the chairman of the Republican Women's Committee in 1989-94. During these years, a number of collections of poems were published: "Hot Snow" (1979), "Loyalty" (1983), "Holy Woman" (1987), "There are those who have survived", "Fire Hurricane" (1993) ., "Words of Tomaris" (1996).

His collections of poems "Pride" and "White Apple" were translated into Russian in those years in Moscow. Then the book of poetic translations

* Sharof Rashidov, a wise, intelligent and selfless statesman, who loved his people and his country with all his heart, found time to follow regional and even district newspapers and was interested in the fate of those who had a talent to light up in the press. ... Thanks to this attention, many writers who came to the capital from distant cities and villages of the country and made a worthy contribution to the development of our spiritual life with their brilliant work and creativity, were well remembered by literature lovers.

"Decision" was published and reached the Russian audience.

In those years he was awarded the State Prize of Uzbekistan.

Halima Khudoyberdieva, who became an event in Uzbek literature with her first poems, was awarded the title of "People's Poet of Uzbekistan" in 1992.

Yuragimga ona arslon qo'ygan in,
...Men taslim bo'lmay turib, so'rmalab,
Qonimizni ichadigan mast yo'qdir.
Ona arslon o'lmay turib, o'rmalab
Bu o'rmonga kiradigan kas yo'qdir…

The shoulders of the poet, who wrote bold poetry and shone like a bright star in the sky of Uzbek poetry, were also crushed by stones. In 1994, the poet's husband was fired (for reasons unknown to us), and Halim Khudoiberdiyeva was also fired. The poet's poems will be removed from school textbooks.

The poet said that she did not leave the house for two years (while her husband was in prison). Unfortunately, in those years when Halima Khudoiberdieva was alone, not a single line of the poetess was published anywhere... Life went on. A living person must live. Later he worked as a literary worker for the "Gulistan" magazine. Graduates of universities usually work in this magazine, "she recalled.Halima Xudoyberdiyeva "Osoyishta sham"da u holatni shunday tasvirlaydi:

Koshonamni, xos xonamni sinchiklab ko'radilar,
Ko'nglim ko'rar, ko'nglim so'rar bir do'st topmay hayronman.
Bir o'y singdi yuragimga xuddi nashtar, xuddi o'q,
Yiqilmagin, yiqilganni suyaydigan odam yo'q.

Poetess, mother of five children, lost her son. This reminds us of the death of Tomaris' son Sparganiz. Life has not rewarded anyone with honey. The strong-willed, staunch poet felt it in the "deepest" and "deepest" part of his heart, which made him rise to his feet again. Because, as the poet herself says:

To'marisdek oyoqqa qalqqan ayol o'lmaydi!
To'marisning tumorin taqqan ayol o'lmaydi!

In 1996, Halima Khudoiberdieva was a leading specialist of the "Yozuvchi" publishing house and the head of the literary department of the "Gulistan". Deputy chief editor of the "Sanam" (1998-2003), editor of the department of the "XXI asr" newspaper since 2004, chief editor of the "Dugonalar" since 2018.

The main thing is that the pen of the poet, who honestly lived his life true to his principles, breathed courage into poetry, worthy of himself and his word, did not fall out of his hands ... As she herself said:

Men otilgan o'qman, ortqa – qaytish yo'q….
(I am like an arrow, there is no turning back…)

In the echoes and awe of poetic vibration, the poet predicted her fate in verses that not everyone would dare to read:

She'riyat, ko'ksimga xanjaringni sanch,
Bu qurbonsiz umr meniki emas...("Holat", 1986)

Collections "Selection" (2000), "I'm on the way" (2005), "Big birds" (2012), "Peaceful candle" (2017) refer to the period of the poet's life, then created and published.

Halima Khudoyberdieva is also an experienced publicist. His articles in The Painful Points of My Heart collection reflect current problems.

In the collection of Halima Khudoyberdiyeva "Osoyishta sham" [1] there is a poem "Tobora Yashin". This poem seems like a prophecy that after the turbulent years of the poet's life, "wonderful days" will come, about which he dreamed all his life and always wished good people.

Boshimdagi bulutlar ko'chadigan kunlarim,
Ko'ksimdagi burgutlar uchadigan kunlarim,
Quvonch daryolarini kechadigan kunlarim,
Yaqin, tobora yaqin!

Yes, in the life of the poet, "the days of crossing the rivers of joy" have come. The truth was finally decided. In accordance with the Decree of the President of the Republic of Uzbekistan in 2017, People's Poet of Uzbekistan Halima Khudoyberdieva was awarded the title "El-Yurt" and the Order of the "Badge of Honor".

The first poems of Halima Khudoiberdiyeva were published in the newspaper of the Yangiyersky district in 1964 - "First Love" (1968), "White Apples" (1973), "Chaman" (1974), "My mountains of support" (1976), "Grandfather Sun" (1977), "Hot Snow" (1979), "Faithfulness" (1983), "Holy Woman" (1987), "There are Those Who Have Reached These Days", "Flame of the Hurricane" (1993), "Sayings of Tomaris" (1996), Choice (2000), I'm on my way (2005), Great Birds (2012), Peaceful Candle (2017); He published collections of poetry in Russian, such as "Pride" (1976), "White Apple" (1979), "Reshimost" (1985), as well as the publicistic work "Pain points of my heart". The play "Alla" - a free translation of the works of the poet Tofon Minnullin - has been staged on the stage of the Uzbek National Academic Drama Theater several times.

I am proud that Halima Khudoiberdiyeva's poems have been translated into many foreign languages.

The famous poet Halima Khudoiberdieva passed away on August 17, 2018 at the age of 71, but her voice resonates with Uzbek poetry. It is no coincidence that dozens of sincere articles have been written about him during his lifetime and after death.

".....It is not easy to be an original poet in Uzbek poetry. Especially in the late 60s - early 70s, when you got carried away with poetry. Half of the visitors were under the influence of Abdulla Aripov, and the other half were "captured" by such poets as Erkin Vakhidov, Rauf Parfi and Omon Matchon. And you acted like the great poets of the 70s - you stopped walking on ready-made flat roads, you looked and found another way. So, Halima Khudoiberdyeva has

her own image in Uzbek poetry, she is a strong poet ...! This is the most important, highest point of creation. This does not happen to everyone. There are thousands of poets in the Uzbek poetry of the 20th century. But only for some of them (4 generations) the poet really influenced the development of the artistic thinking of the people. Are you a few people ...! What about the rest? The rest follow in their footsteps and create a complete picture of the poetic period. However, I repeat, there is little "muzyorar" and they are rare ", writes Ulugbek Hamdam in the article" Two words about the personality and poetry of the national poet of Uzbekistan Kh. Khudoyberdiyeva*"* [4].

There is no exaggeration in the metaphors used by Ulugbek Hamdam: "o'*zbek she'riyati qahkashonida asl nusxa shoir", "muzyorar shoir".* We know that the "original poets" are physically lost, but they are not "dead." Due to the incomparable legacy created by these originals, his name will be sealed forever.

We prove our point. If we are talking about a woman, especially an Uzbek woman, and are looking for a metaphor to define her, first of all, there is a verse that has reached our tongues and hearts: "You are still a holy, holy woman." Is there an Uzbek who has not read or heard his song ?! So, as long as there is an original poem in the language of ordinary people, the poet will never die.

As the poet herself put it: "Literature works for the soul. This prevents him from being stoned. He teaches people to love. This encourages us to go towards each other, and not in the opposite direction. He also teaches to take the first step without hesitation. Is it possible to live without clean river water, which teaches us to love and live ?! [3] "Literature is true poetry. It can be said without exaggeration that the original poems are the creative legacy of Halima Khudoyberdyeva.

The voice of the river comes from the poems of Halima Khudoiberdiyeva, a sensitive, strong-willed, sincere, talented and sensitive poet. And people cannot live without a river "[2]. After all, the poet's creative heritage is "a clear river, teaches to love and live" - this is literature itself.

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QR – Issue QR – Article

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THE OPPORTUNITIES FOR VIRTUAL EXPRESSION OF SPEECH

Abstract: *The article focuses on the ability of verbal communication to convey information and the linguistic essence of non-verbal linguistic means-their place in the grammatical system. Digital speech communication has brought people's communication to a new level. Virtuality, equality of communicators; observation of the peculiarities of machine voice, such as the hypertext form. The article focuses on address (mass or personalized direction), contact direction, time direction (synchronous/asynchronous communication), level of interactivity (speed of response of recipients to messages), regulation (presence of strict specifications for message form/content), taking into account the parameters of the communication organization of well-founded opinions.*

Key words: *speech communication, interactive speech communication, communication mechanism, networking field, forum, social network, blog, audio-visual communication, internet.*

Language: *English*

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Introduction

Communication is impossible without the contact and interaction of members of the group with each other (sharing information and receiving information). For this reason, the idea of 'visual contact' seems to be obsolete. Communication is an important part of speech, of the exchange of ideas and of knowledge. But verbal communication (Russian: «речевое общение», English: «discourse») is one of the most popular functional words. In certain instances, of course, the method of reasoning relates to the material realization of linguistic possibilities in writing or orally. However, there are also several forms of contact not related to the occurrence of linguistic units. [14]. Non-materialized modes of communication of linguistic means are also called non-verbal communication. In our culture, and also in the rules of Sharia, there is an ethical and esthetic concept of "Silence - a sign of consent" which should also be used as a means of unconditional communication. Take a look at the story "Sharoit" by Tilavoldi Juraev:

…There was a peculiar silence in the car. It was by no means a silence of bitterness, rage, resentment, resentment, remorse. This silence has been a secret silence (Juraev T. Villages).

Another example of this would be Yu. Solntseva's "Seventeen Moments of Spring," in which Stirlitz, a spy, meets his wife, who came to see her as a casual companion at the Elephant Café in Berlin. This contact was a very necessary meeting for both Stirlitz and his wife. This meeting informs that both parties are safe and that they miss each other. In fact, this information was given, accepted without words-language means.

Communication is also correlated with the transmission of information through visual, verbal, linguistic means and non-verbal means (gestures, various signals, symbols, symbols, symbols) as **verbal** or **non-verbal** communication is classified[15].

Verbal communication is the combined use of verbal and non-verbal (jointly) means in the communication process. It is the very first indication of verbal contact. For example a person who uses the term *"Assalamu alaykum wa rahmatullahu wa barakotuhu"* verbally, of course, has a spiritual and cultural level that corresponds to that verbal formula-age, lineage, clothes, social status, etc.-and in relation

to specific audiences. Take a look at an example below:

The sheik stepped out of the chair and asked the guests to start by sitting on either side. The heralds ran and came to the doyen (the eldest): one had a bowl of water in his side, and the other had leather salt in his hand. The old man applied salt to the water and lifted the bowl high:

-Assalam alaykum wa rahmatullahu wa barakotuhu!

-Assalom of Vaalaykum! Replied the sheik

(Radiy Fish. Jalaliddin Rumi)

It is clear from this record that speech activity is inextricably linked to a set of factors such as linguistic, ethical, aesthetic, national, spiritual-cultural, social, causal (cause, effect, purpose) and so on. However, this is not the only basis that needs a particular pragmatic term of speech communication – speech communication is often distinguished as a specific form of use of semiotic systems. What's the feature? While it is a semiotic system based on the structure of the language[11], it varies significantly from other semiotic systems[11]. As the main aspect of these variations, scientists unanimously point out three characteristics. These are followings:

1. Language can be the basis of all other social semiotic systems in the sector. Thus, language can be called the general, primary social semiotic system, the main basic system that easily replaces it.

2. In language, unlike all other semiotic systems, the relationship between expressive and non-expressive sign is asymmetrically dualistic in nature. While the form/representation may be linked to multiple content/expressions, the same content/representation may be related to different forms/expressions[4].

3. Language signs are self-evolving.

These features, which are ontologically (by nature) specific to language symbols, are not specific to speech. Some researchers exclude the communication process, including verbal communication, from the semiotic system, saying that there is no sign in communication"[10]. Indeed in verbal communication, linguistic character sociality is to some extent extinct. Individuals in communication may be required to understand common social symbols. This feature is most pronounced in terms of slang and jargon [6,10,13,17]. For instance,

With a knock on the cell door, Maxsum stopped talking.

*- **Well**! Said Hayit, looking at the door. This was the term of the Bukhara madrassas, "Please enter." But the knocker, who must not have understood the meaning of the word, knocked again without opening the door.*

"Please, come in!" Said the owner of the room. (Ayniy S. Doxunda.)

The play also uses antonyms of such units as welcome, well, come in:

When the soup was finished, there was a knock on the cell door.

- No permission, diet! Said the Wolf.

"I am the madrasah's Sufi," said the knocker.

"Well, leave the doxunda." Go back yourself! No permission, it is still diet!, said Hayit again. (Ayniy S. Doxunda.)

According to the custom of the madrasa, if a person who knocked at the door of a cell was not accepted, the word diet would be answered (the original meaning of the word diet was 'diet'-'not eating certain types of food'). If that person is accepted, even if a good voice is heard, knocking on the door again is due to a failure to understand the meaning of that slang word in the madrasa.

It is also quite conditional in verbal communication (NM) that the symbol is symbolic. It may have lost, as in the example above, a certain degree of readiness, obligation and generality to a particular society, or it may have acquired a different meaning.

First, verbal communication is very different in terms of content, essence, purpose, form and context. It occurs at random, unplanned (e.g., street greetings and conversations between random communicators in the cafeteria) and purposeful, carefully planned (e.g. scientific lectures in audiences, special-purpose conversations on television or radio).

There is another form of communication that could be called "virtual speech communication." Various global communication opportunities have emerged with the development of information technology. With the advent of the Internet, brokerage connections have increased considerably and various methods of data transmission have emerged. Emails, forums, social networks, blogs, chats, etc. [7], for example. Virtual speech communication is taking people's communication to a new level. This allows you to store and transmit large amounts of data, communicate online, and use audio-visual communication channels. Digital speech communication is wider than other forms of communication.

The basic features of virtual speech communication are: virtuality-the ability to interact with an anonymous person; the ability to share knowledge "remotely" equality of communicators; hypertext services; descriptive emotions utilizing special characters (laughs); repeated use of exclamation and question marks; repeated use of the same letter; use of asterisks instead of rough wows.

Virtual dialog can be defined as follows: 1) the mass nature of communication; 2) the direction of communication: from many to many; 3) the synchronous communication; 4) the average speed of notification to the recipient; 5) the lack of strict criteria for the form and content of the message. Today, a modern electronic communication environment has been created, such a communication service being

introduced in two different ways: direct (PC, chat) and indirect (email, forum, teleconference)[1,2,5].

Chat is one of the methods of direct contact. It's a networking program that is a way of rapidly exchanging messages over the Internet in a real-time system. Communication and messaging in the forum-related chat system takes place in the real-time system. The word chat is derived from English and means "friendly chat, hangoma"-electronic chat, real-time machine contact. Chat is a conversation between many Internet users at the same time[5]. In this case users are talking via the Internet, that is, exchanging news via email, discussing a subject or talking to each other. In such a virtual communicative space, all users communicate by exchanging messages in the form of peer-to-peer writing. In the field of virtual communication, speech discourse means the simultaneous communication between two or more users through the Internet. It does not matter where the users are located, i.e. where the users are in the virtual communication space. You only need one of the following special programs: Skype, Mail Agent, Google Talk, ICQ. Users can communicate in a virtual communicative process by connecting a microphone and a headset to a device and using apps.

Chat, like regular speech communication, has three components: beginning a conversation, saving a conversation, and finishing a conversation. The user communicates on the basis of the language and pragmatic rules of the Uzbek language chat, which convey their presence in the virtual communication space.

If we say video communication over the Internet, users see each other on a computer screen (online), which means that the moving images of users are transmitted to each other. The computer that connects to this video is called a webcam. In the course of video contact over the Internet, not only do all the users involved in the interaction hear each other, but they also see each other.

In short, the issues of oral and written communication between people are repeatedly discussed by philosophers, sociologists and linguists, contributing to the advent and further growth of the theory of speech communication. As the global computer network opens the door to new possibilities for contact between members of different ethnic and cultural groups, there is a need to further deepen scientific studies on the topic of language and culture in Internet linguistics.

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QR – Issue QR – Article

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METHODOLOGICAL FOUNDATIONS FOR THE DEVELOPMENT OF THE FINANCIAL MANAGEMENT SYSTEM

Abstract: *This article examines the development of financial management systems in joint stock companies, the use of various financial methods and support in the management of joint stock companies.*

Key words: *competition, privatization, joint stock company, financial management, income, capital.*

Language: *English*

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Introduction

After the Republic of Uzbekistan gained independence, the methods of conducting business activities and managing the kakhona began to change. Issues such as the economic aspects of the introduction of corporate governance principles, the formation of an effective system of management of companies, principles of management, factors affecting its formation began to be considered.

After gaining independence of the Republic of Uzbekistan, the creation of legal and organizational bases for the formation of a multicultural economy and competitive environment capable of ensuring high rates of economic growth and sustainable development of society was defined as a priority task. The experience of reforming the countries of transition economies confirms that an important tool for the harmonious transition from an administrative - planned economy to a market model of Economic Conduct is privatization and aksoneralization, which plays a special role in the formation of a class of real estate owners and the introduction of effective methods of corporate governance of privatized property.

2. Literature review

In the study of financial management, there are various definitions and views by scientists.

A.D. Sheremet, A.F.Ionova believes that financial management is the process of managing the formation and use of monetary turnover, stockadorlik financial resources of the society[1].

A.N Gavrilova said that financial management is a system of managing the finances of the society and that in order to improve the efficiency of production, it is aimed at improving and developing financial relations through the constant introduction of new principles, forms, composition and methods of management[2].

E.I.Shoxina financial management is a science that studies the solution of strategic goals and tactical issues that society has put forward through effective management of its financial resources .adorlik[3].

S.V.In the interpretation of Galiskaya, financial management is defined as the management of the assets of enterprises and the sources of their formation[4].

In our view, financial management is the science and art of managing the cash flows of the stock

[1] A.D. Sheremet, A.F.Ionova Finance predicate: management I analysis three.pos. M: infra-M 2007g.str36b.
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companies by attracting the most rational sources of financial resources and using them with the greatest efficiencyadorlik to achieve the strategic and tactical goals of the stock companies.

3. Tadio of metodologias

In our opinion, financial management is the science and art of managing the cash flows of joint-stock companies by attracting the most rational sources of financial resources and using them with the greatest efficiency to achieve the strategic and tactical goals of joint-stock companies.

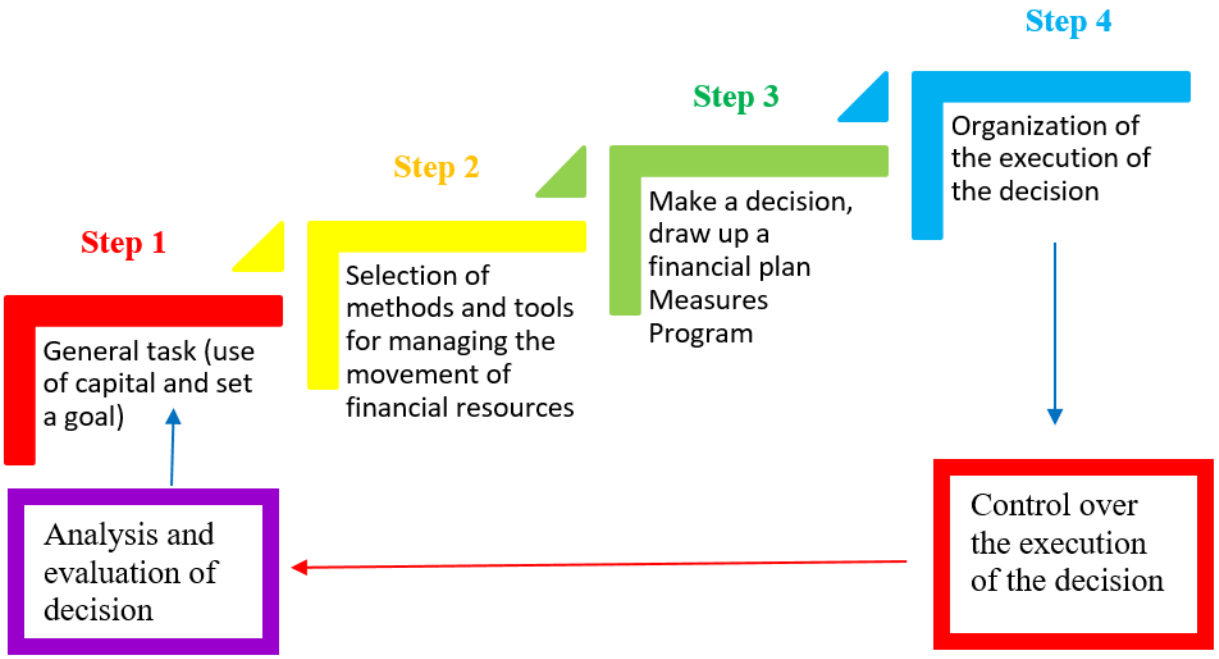
4. Analysis and discussion of results

The law of value plays a regulatory role in the market economy, and financial relations cover the entire production process, including all economic relations in the stockadorlik societies. Therefore, financial management is a fundamental component of the general system of managing a stockadorlik society. The objective of financial management-profit maximization is the goal of the entire management system, including technical-production management at the same time. The process of making financial decisions, the decision making of any management will consist of three stages (Figure 1).

Each type of decision requires a specific supply of information and analysis. Forecast and plan decisions are based on a generalized accounting report for a number of years or quarters using perspective, trend analysis techniques. Decisions that regulate the course of economic activity are based on operational, including accounting information, using operational analysis methods. Evaluation and control decisions are based on retrospektiv, support for current analysis methods, comparison of current and plan (forecast) data for the current accounting period.

The content of modern financial management is characterized by deepening the methods of financial analysis and solving new problems associated with the transition of the Republic of Uzbekistan to market conditions. Such problems are considered to be related to the effectiveness of capital structure management, the use of methods of economic diagnostics, financial risk management, financial support, for example, with the help of discounting income and capital, determining the cost of capital. Their solution in management activities will enhance the efficiency of financial management system in the stock companies.

Analysis and evaluation of decision resultsControl over the execution of the decision.



Picture 1. Financial management overview chart [5]

Financial management actadorlik is an integral part of the general management system of the society, which in turn includes the formation of financial resources that arise during the movement and movement of financial resources actadorlik represents the rational management system of the process of financing economic activities of societies. Proceeding from this, financial management can be described as a system of rational and effective use of capital, as a mechanism for managing the movement of financial

[5] Developed by the author.

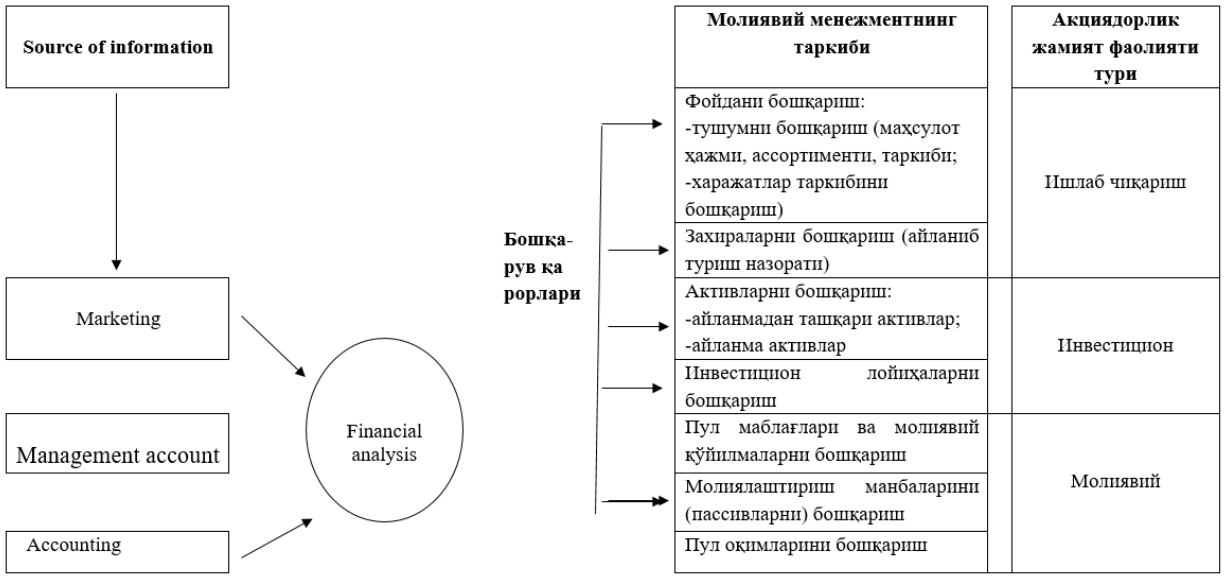
resources, which is aimed at increasing the volume of capital, the growth of investments and the growth of financial resources. The general view of financial management is reflected in the chart above. (Picture 1).

Financial management is directed to support the normal treatment process of financial resources, whose effectiveness is characterized by the speed of turnover (speed of treatment). The content of financial management is shown in Figure 2.

A new complex stage of the formation of the market economy in the Republic of Uzbekistan is the action aimed at achieving strategic and tactical goalsadorlik the need for financial management as a management of public finances has arisen.

The primary objective of financial management is to maximize the economic efficiency of the owner. Achieving this goal is effective dividend and investment policy, Equityadorlik credit policy of the society, adequate liquidity and optimal working capital policy, maintaining the policy of optimal formation of taxable base.

The second objective of financial management is to complement and define the primary objective. Its essence is to organize in the Society an effective business partnership with customers and creditors, economic entities that serves the development of the business of the society. The mechanism for ensuring the effectiveness of business cooperation is based on the relationship of the parties –the control over the full repayment and timeliness of the poured funds, the provision of guarantees, collateral, rent, commodity loans, banking services in accordance with the main amount of debt is to draw up an effective scheme of Service. The bond plays an important role in substantiating the conditions of zaemi, ensuring the positive effect of financial support and others. (Picture 2).



Picture 2. Content of financial management [6]

The third objective is the expression from the social responsibility of the activities of the stockadorlik societies. Shareadorlik the stability of business activity of the company creates good prospects for expansion of the taxation base, growth of employment, increased demand for means of production, support of commercial relations in the interaction and interaction between participants of market relations within the country and outside its territory. Particular attention will be paid to social indicators that affect economic and financial growth, social planning, investments in human capital, potential bankrot monitoring and business decision making.

In the process of development of the country's economy, the objectives of financial management change. For example, in conditions where the tax legislation is unstable and the tax burden is large, the duties of tax management are the choice of accounting policies for taxation purposes, the optimization of tax costs, the planning of taxes, the use of deductions and discounts provided for in the legislation.

Any business starts with putting three questions that it is necessary to find the answer to them:

[6] Developed by the author.

where to find the source of financing and what should be their optimal content of interest?

adorlik what should be the size and optimal composition of the assets of the company that allow the company to achieve its intended goals and objectives?

adorlik how to organize current and future management of financial activities that ensure financial stability and solvency of the company?

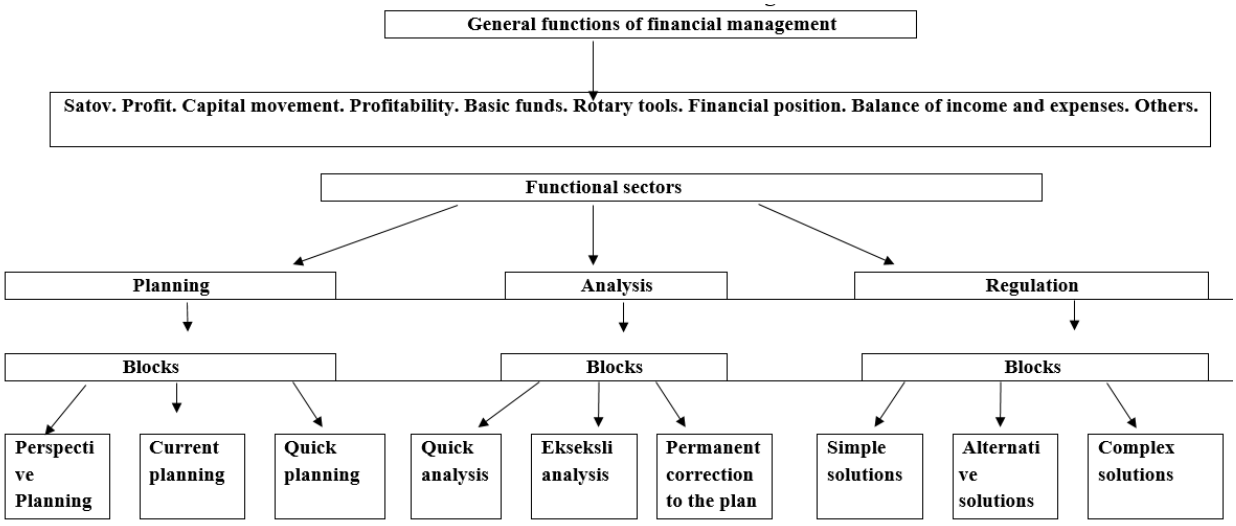
These issues are resolved within the framework of financial management as a system of effective management of financial resources, which is considered one of the main subsystems of the general system of Public Administration.

As mentioned above, the purpose of financial management is profit maximization. However, the maximization of the market value of the stockadorlik society does not always automatically reach the account of maximizing the amount of profit it receives. For example, the high profits received can be fully spent on the current objectives, as a result of which the stockadorlik society will be deprived of the primary source of its financial resources for development. In addition, a high profit level can be achieved when the level of financial risk is high, which can justify the decline in the market value of the stockadorlik societies.

The following are the main functions of financial management in stock companies:

- ensuring material balance of the movement of cash and cash flows;
- achieving financial stability and financial independence is a financial dilemma;
- provide sources of financing – internal and external short-term and long-term financing to find sources of financing, increase the profitability of their capital and reduce financial coststirishga to the extent that it is possible to combine these sources optimally;
- effective use of financial resources to achieve the strategic and tactical goals of the companies.

Sharesadorlik the management of the finances of societies, or, in other words, the functional functions of financial management can be reflected in the form of the following graph (Figure 3).



Picture 3. Functions of financial management [7]

5. Summary and suggestions

In conclusion, we should emphasize that effective management practice in Uzbekistan is at the stage of development, faced with problems associated with the object of economic hardship, imperfection of the normative-legal framework, insufficient level of training of specialists. For the modern economy, the following are characteristic:

- adorlik companies with privatized shares past low level of authorized capital low level of authorized capital;
- the value of resources in financial distress;
- adorlik low stock volatility in societies attracting investment;

[7] G.B.Polish Financial Management. Training manual. M.:- Knorus. 2010. It's 15b.

➢ development of the stock market and financial infrastructure.

Proceeding from the above, we can conclude that the development of financial management in the Republic of Uzbekistan, considering the trends and conditions of changes in the economy, allows us to conclude that this direction will not only have a certain tradition, but also a bright future.

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ABOUT THE PECULIARITIES OF MAKING ACCESSORIES OF THE ARCTIC MILITARY SERVICE COSTUME IN THE FORMATION OF COMFORTABLE CONDITIONS

Abstract: *The paper presents the results of studies on the reasonable choice of packages of materials for adjustments to the knee and elbow in order to ensure the comfort of servicemen in the Arctic during the entire time of his stay in climatic zones with low temperatures. Testing of the software product confirmed its high efficiency.*

Key words: *software product, software mathematical editor MAPLE, package of materials, heat and mass transfer, comfort, climatic zones with low temperatures, military personnel, Arctic.*

Language: *English*

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Introduction

UDC 685.74: 317.72

Cold is one of the harmful environmental factors affecting humans. Reactions to the effects of cold can be both functional and pathological in nature: disease, defeat, death.

At low temperatures, a person can experience cold stress. Cold stress can be caused by cooling of the body as a whole or part of it, most often of the face and respiratory organs, hands, feet. At the same time, different types of cold stress are formed due to a combination of climatic factors, physical activity, clothing, etc. The main types of cold stress are:

- cooling the whole body;
- cooling of the limbs;
- skin cooling (convective);
- skin cooling (conductive);
- respiratory cooling.

The combinations of climatic factors are as follows:

- air temperature, average radiation temperature, air mobility, physical activity, relative humidity of air, clothing;
- air temperature, air mobility;
- the surface temperature of the clothing;
- air temperature, physical activity.

The effect of cold stress on humans is due to the intensity of cold stress (tissue cooling).

Hypothermia is a result of extreme cold stress intensity.

The results of the intensity of cold stress of the 1st degree will be:

- local cold damage - frostbite, numbness;
- cold damage without freezing;
- pain;
- functional damage;
- acute cardiorespiratory effect;
- deterioration in performance;
- the discomfort;
- heat balance.

Main part

Discomfort can cause a decrease in activity, especially in relation to solving problems associated with neuro-emotional stress, with the need to concentrate, and also increase the risk of occupational accidents and injuries. Moreover, cooling of tissues can lead to decreased physical activity, which contributes to the risk of accidents.

Cooling of a person, both general and local (especially of the hands), contributes to a change in his motor activity, disrupts coordination and the ability to perform precise operations, causes the development of inhibitory processes in the cerebral cortex, which can cause injury. With local cooling of the hands, the accuracy of the combat mission decreases; activity decreases by 1.5% for each degree of decrease in the temperature of the fingers.

A drop in body temperature, muscle temperature and skin temperature leads to a decrease in the ability to perform physical work due to a decrease in the level of metabolism.

These changes reduce coordination and can lead to an increase in accidents, especially when performing a combat mission in the cold. The sensitivity of the receptors also changes with a decrease in skin temperature. So, at a skin temperature of 20 ° C, it is 1/7 of normal.

The above means that a set of thermal protective clothing intended for work in open areas, in particular in climatic regions IA and IB ("special" and IV climatic zones), must include protective equipment for the face and respiratory system.

The hands and feet play an important role in thermoregulation, being specific heat exchangers between the body and the environment. The state of thermal comfort is provided at a foot skin temperature of 29-31 ° C and a heat flow of 52-87 W / m2. The thermal resistance of the tissues remains within the range of up to 0.3 clo.

Studies by a number of authors have shown that with an increase in the thermal insulation of shoes, the weighted average temperature of human skin increases (from 32.0 ± 0.30 to 33.5 ± 0.32 ° C) and the weighted average heat flux decreases (from 90.3 ± 4.0 to 57.0 ± 0.32 W / m2 (≈ 40%)). A decrease in total heat loss as a result of an increase in the thermal insulation of shoes can be 17.1 ° C.

Heat loss by convection and radiation from the surface of various areas the human body when it is cooled:

a) Head 19.0W (12%)
b) Hands 44.4 W (31%)
c) Torso 36.0 W (25%)
d) Feet 49.0W (32%)
e) Whole person 148.4W (100%)

The amount of thermal insulation in a shoe can have a significant impact on a person's overall heat loss and body surface temperature. This means that when developing thermal protective clothing, the requirements for thermal insulation of all areas of the body must be met. With an increase in the thickness of the package of materials for insulating clothing, almost only the skin temperature of those areas of the body that are protected (trunk, shoulder, thigh) rises... ABOUTthere is only a slight increase in skin temperature in the area of the hands. A change in temperature, depending on the degree of warming of the surface of the body, is practically not observed.There is a definite relationship between the general thermal state of the body and the degree of cooling of a particular area of the body, in particular, feet and hands. At the same time, the thermal insulation of the latter has a significant effect on the general heat exchange of a person.

The basis for the creation of thermal protective clothing for operation in the Arctic should be based on a scientific principle that takes into account the physiology of heat exchange between humans and the environment.

Requirements for materials and constructionthermal protective clothing in the Arctic:

- the heat-shielding ability of clothing for protection from cooling is determined by the thermophysical indicators of the package of materials from which it is made, by its design, type (jacket, jacket and trousers, overalls, etc.);
- a package of materials for heat-protective clothing is formed from a base material, an insulating pad and a lining. If necessary, to reduce the air permeability of the package of clothing materials, a windproof pad can be used, which should be placed between the base material and the insulation pad;
- the main material (cover, outer layer) determines the appearance of the clothing and performs protective functions. It must have protective properties that correspond to the operating conditions, be resistant to mechanical stress, precipitation, light, various types of pollutants, and be easy to clean from contamination. It must be able to conduct moisture from the clothing space into the environment and have adequate air permeability to the wind speed.

The work examines the process of cooling the surface tissues of the knee and elbow of a person when exposed to low temperatures (table 1).

Table 1 - Characteristics of the package of materials for the protection of elbow and knee joints

Model	Package materials	Thickness, mm	Thermal conductivity coefficient λ, W / m ºC
1	2	3	5
Model 1	cotton linen	0.9	0.044
	Wool sweater or pants	2.4	0.027
	Nylon lining	1.6	0.042
	Thinsulate insulation (1 layer)	6.0	0.044
	Arctic-tech - outer layer (85% PE + 15% cotton)	1.8	0.041
	Arctic-tech (knee pad or elbow pad)	1.8	0.041
Continuation of table 1 Model 2	Thermal underwear	1.76	0.039
	Wool sweater ooze pants	2.4	0.027
	Nylon lining	1.6	0.042
	Thinsulate insulation (21 layers)	12	0.036
	Arctic-tech - outer layer	1.8	0.041
	Porous rubber - damper	2.2	0.027
	Arctic-tech (patch pocket)	1.8	0.041

For the description, a mathematical model is built in the form of a boundary value problem:

$$\frac{\partial T_i}{\partial t} = a_i\left(\frac{\partial^2 T_i}{\partial r_i^2} + \frac{2}{r_i}\frac{\partial T_i}{\partial r_i}\right) + \frac{q_{iv}}{c_i\rho_i},\ i = 1,2,\dots n,$$

$$T_1(0,t) \neq \infty;$$

$$\lambda_n \frac{\partial T_n}{\partial r_n}(R_n,t) + \alpha(T_n(R_n,t) - T_c) = 0;$$

$$T_{i-1}(R_{i-1},t) = T_i(R_{i-1},t);$$

$$\lambda_{i-1}\frac{\partial T_{i-1}}{\partial r_{i-1}}(R_{i-1},t) = \lambda_i \frac{\partial T_i}{\partial r_i}(R_{i-1},t),\ i = 2,\dots n.$$

Initial conditions, where $T_i(r_i,0) = f_i(r_i)$ $t-$ time; - temperature of the i-th layer; $T_i\, i=1,\dots n$; - ambient temperature; - coefficient of heat capacity of the i-th layer; - coefficient of thermal diffusivity of the i-th layer; - the density of the i-th layer; - coefficient of thermal conductivity of the i-th layer; volumetric heat flow density of the i-th layer; coefficient of heat transfer from the surface of the skin or protective layer (hair, hat); $T_C c_i a_i \rho_i \lambda_i\ q_{iv} - \alpha - f_i(r_i) -$ initial temperature of the i-th layer.

The solution to the problem is in the following form

$$T_i(r_i,t) = \sum_{k=1}^{\infty} D_k(t) X_{k,i}(r_i),$$

Where

$$X_{k,i}(r_i) = \frac{1}{r_i}\left(A_i \sin\left(\frac{\mu_k r_i}{\sqrt{a_i}}\right) + B_i \cos\left(\frac{\mu_k r_i}{\sqrt{a_i}}\right)\right) -$$

eigenfunctions of the corresponding boundary value problem:

$$\frac{\partial^2 X_i}{\partial r_i^2} + \frac{2}{r_i}\frac{\partial X_i}{\partial r_i} + \frac{\mu^2}{a_i}X_i = 0,$$

$$X_1(0,t) \neq \infty;$$

$$\lambda_n \frac{\partial X_n}{\partial r_n}(R_n) + \alpha X_n(R_n) = 0;$$

$$X_{i-1}(R_{i-1}) = X_i(R_{i-1});$$

$$\lambda_{i-1}\frac{\partial X_{i-1}}{\partial r_{i-1}}(R_{i-1}) = \lambda_i \frac{\partial X_i}{\partial r_i}(R_{i-1}).$$

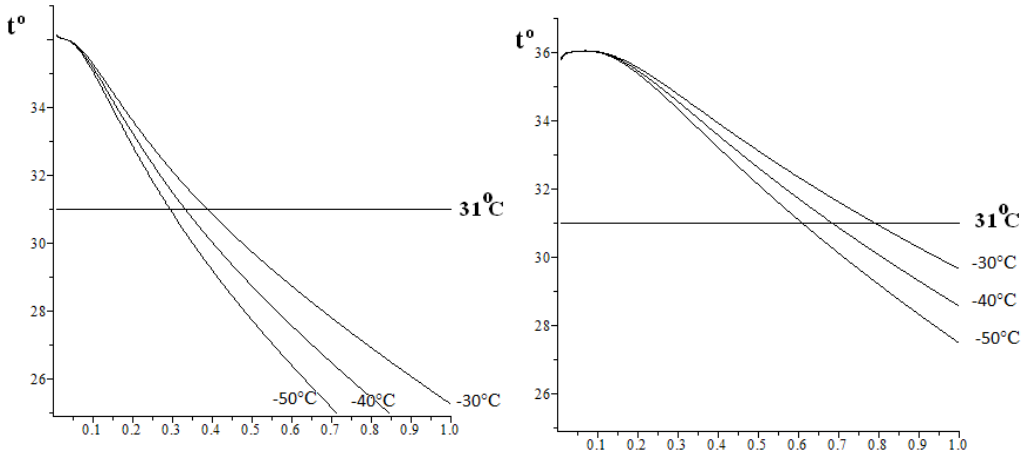


Figure 1 - knee:
a) model 1; b) model 2

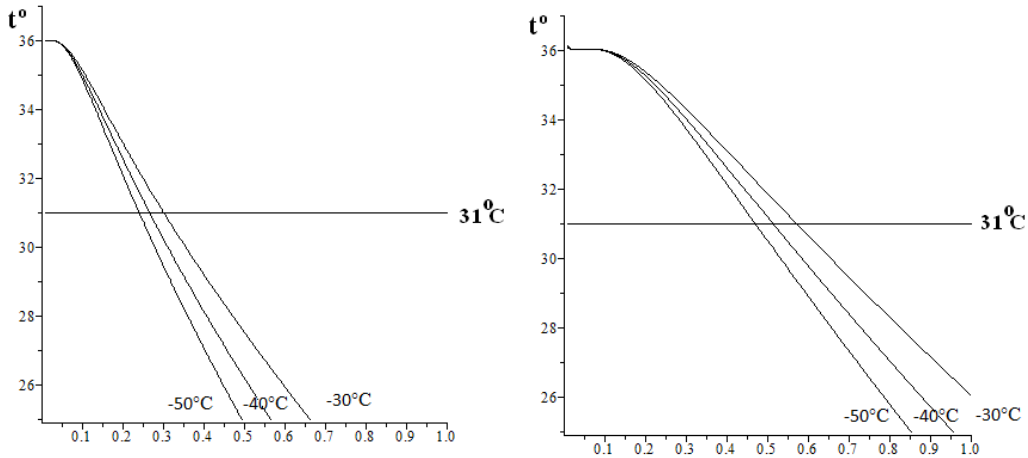


Figure 2 - Elbow:
a) model 1; b) model 2

Currently, one of the directions for developing clothing for the Arctic conditions is the field of professional clothing, in particular, clothing, including mittens and gloves for the needs of federal authorities. Survival in the polar regions directly depends on body temperature, or rather, its preservation. And this is possible only with the help of clothing.

The urgency of the problem of creating a suit for protection from the cold is confirmed by numerous studies in this area, conducted by domestic and foreign scientists. The first requirement for a suit in the Arctic is layering. The top layer should be moisture resistant, the middle layer should contain woolen fibers (preferably) or synthetic, the inner layer of the suit with good breathability. The second requirement is that the suit must be comfortable. This is ensured by sufficient air circulation and does not provoke overheating of the soldier's body.

The range of materials used for the production of thermal protective clothing is very diverse in terms of raw material origin, production methods, purpose and can be combined into the following groups:

- basic - fabrics of various fibrous composition for the top and lining, duplicated fabrics, films, fabrics with film, windproof and rubber coatings, etc.;
- insulation materials - batting, cotton wool, foam rubber, artificial and natural furs, non-woven insulation, etc.
- materials for joining parts - sewing threads, adhesive and thermoplastic materials, welds, etc.;
- accessories - buttons, hooks, loops, buckles, buttons, zippers, Velcro, etc.

A software was developed that allows you to select a package of materials for an assortment of clothes. As an example of the study, a heat-protective jacket and mittens for an ordinary soldier in the extreme conditions of the Arctic were chosen. The design and manufacturing technology of products meets the requirements of GOST 12.4.236-236-2011 SSBT. Special clothing for protection from low

temperatures. And it is made in accordance with the basics of unit-by-unit processing of uniforms.

When choosing packages of materials for the study, the physicomechanical, thermophysical characteristics of materials, information about the specifics of the operation of this clothing, which were obtained from open literature sources, were taken into account.

With an increase in the thickness of the package of materials for insulating clothing, almost only the temperature of the skin of those areas of the body that are protected (trunk, shoulder, thigh) rises. Only a slight increase in skin temperature in the area of the hands is noted. A change in temperature, depending on the degree of warming of the surface of the body, is practically not observed.

The main role in protecting a person from the cold belongs to behavioral thermoregulation, which consists in the active, targeted regulation of the thermal load on the body .. Due to the need to be in an open area during the cold season or in an unheated room, personal protective equipment is of great importance, and namely, a set of items that provide adequate protection from cooling all parts of the surface of the human body in accordance with the specific conditions of his activity. The cold protection kit includes heat-protective clothing (for example, jacket and bib, jacket and trousers, overalls), headgear, gloves and shoes.

The creation of heat-protective gloves and gloves is a complex scientific and practical task, since gloves and gloves must meet a set of requirements, which are often incompatible with each other. So, for example, clothes should combine light weight and high heat-shielding properties; smallair permeability and sufficient moisture permeability necessary to ensure human moisture exchange with the environment. Clothing should protect the person from cooling at rest and not cause overheating during intense physical activity.

Reasons that can make design difficultheat protective gloves and gloves in accordance with the required thermal insulation:

- an increase in the thermal insulation of the kit is accompanied by an increase in its mass, which causes an additional load on the body and leads to an increase in energy consumption, a decrease in activity and the risk of an increase in injuries;
- the peculiarities of heat exchange in various parts of the human body, limiting the possibility of proper protection of some of them (hand, foot) due to the need to comply with ergonomic requirements;
- the traditional method of increasing thermal insulation by increasing the thickness of the package of materials, including insulation, is effective only within certain limits;
- human heat exchange is influenced by a complex of meteorological factors: air temperature, speed of movement, humidity, insolation, protection from which requires a different approach to the selection of technical indicators of materials and the development of clothing design.

An important role in the creation of clothing for military personnel in the Arctic is the protection of hands and feet. In this regard, the calculations of the thermal protection of the hands were made.

Table 2 shows a set of a package of materials for gloves and gloves.

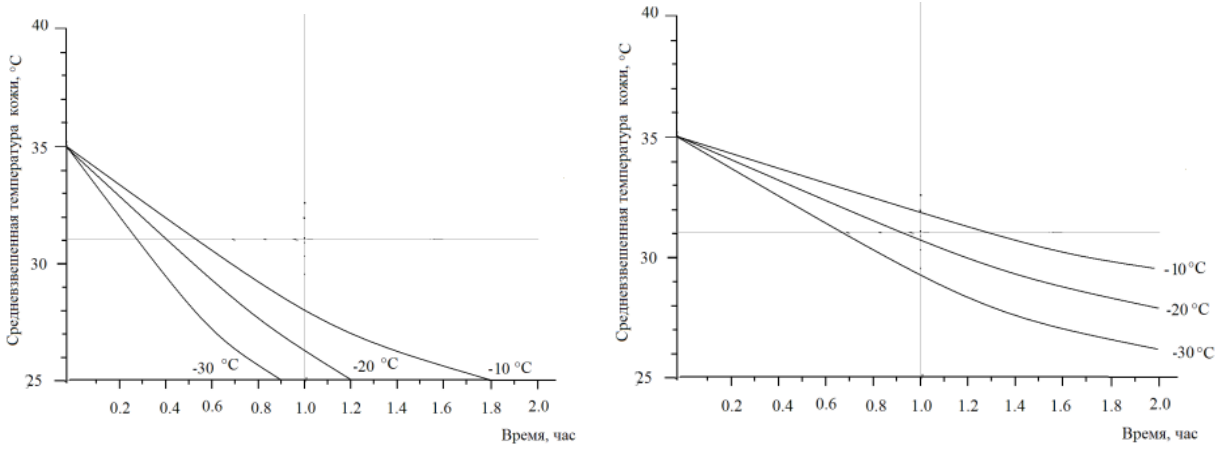
Table 2 - a set of a package of materials for mittens for military personnel

Package materials	Thickness, mm	Total thermal resistance Rsum, m2 · ˚C / W
air	1	0.026
fur	5	0.04
gasket	0,4	0.04
leather	2	0.06

To calculate the temperature distribution, we used the Maple mathematical packages. Input data of the program

- the thickness of the layers of the package of materials;
-coefficients of thermal conductivity and thermal diffusivity of these materials;
- the density of the heat flux coming from the body to the inner surface of the package;
- ambient temperature;
- the initial temperature of the package of materials that forms the suit;
- the coefficient of heat transfer from the outer surface of the package to the environment.

The calculation results are shown in Figure 3.



a) for thumb packs **b) for hand material packages**

Figure 2 - The result of the calculation of the dependence of the weighted average temperature of the skin of the human hand on the time spent at low temperatures (-10 °; -20 ° C; -30 ° C)

The solution to the problem is reduced to finding such a combination of the packet thickness in separate sections of the model, which implements a minimum heat flux from its surface with a restriction on the volume of the packet mass. In the classical approach, such a normalization equation for the weight of the insulation takes into account the thickness of the insulation for the entire geometric image of the package.

Thus, it can be concluded that using the proposed mathematical model, it is possible to optimize the choice of materials for the manufacture of heat-protective clothing.

The developed program allows in the process of calculations to change the parameters of the model: to introduce new layers of materials into the package of the corresponding sections.

The performed calculation showed that it is possible to use the software product to select the optimal package of materials for insulated gloves and gloves for military personnel. The introduction of the software product will allow designing a clothing package taking into account the climatic zones of the regions and the specific requirements of consumers, including for the conditions of the Arctic.

Conclusion

The development by the authors when using the MAPLE product allows for a separate selection of a package of materials for applying to the knee and elbow in order to provide comfortable conditions for the Arctic Servicemen during the entire time spent in low temperature zones. Justified use of a software product will confirm its high efficiency.

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ON THE ROLE OF THE ASSORTMENT POLICY FOR THE PRODUCTION OF COMPETITIVE AND DEMANDED DOMESTIC SHOES

Abstract: *The article considers the target segment (market) as a segment selected as a result of market research for a particular product or service, characterized by minimal costs for means of promoting goods and providing the enterprise with the bulk of the result of its activities. The footwear market is an integral element of economic relations, the main participants in which are, on the one hand, shoe manufacturers, and on the other, consumers. As a product in this market, footwear is one of the most complex groups of non-food products with a very diverse assortment. Segmentation was carried out, during which it was revealed that when creating new enterprises for the production of footwear products, the selected five subjects of the Southern Federal District and the North Caucasus Federal District are not attractive in a competitive environment due to the successfully developed footwear production. The basic requirements to be met by modern shoe production have been determined.*

Key words: *market, costs, quality, footwear, competition, assortment, demand, competitiveness, demand, image.*

Language: *English*

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Introduction

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Shoe companies have never found themselves in such a situation as they are now. All markets are divided into many segments. Specialization has reached such a level that it is still possible to hide from competition only in a small space between two adjacent segments of different markets or the same market.

What is the main thing today for the success in the market of many new and long-standing firms, small, medium and large enterprises, many of which were small not so long ago, for numerous commercial structures and joint ventures? This is the ability of the firm to provide the consumer with shoes of higher quality than before, and moreover, for the same or less price.

Modern production or, as it is also called, world-class production must meet the following requirements:

– have greater flexibility, the ability to quickly change the range of products. The life cycle of products has become as short as ever, the variety of product assortments is higher, and the seriality of products, the volume of batch of a single release is

less. Hence, production focused on the release of mass, standardized products (strictly corresponding to standards, specifications, technical conditions), unable to constantly adapt to the needs of real, often small groups of consumers, is now doomed to extinction;

– use new forms of control, organization and division of labor, taking into account the more complex production technology;

– rely on comprehensive quality management. Requirements for quality not only increased, but also changed the nature of decision-making: it is not enough to produce good products, it is also necessary to think about organizing after-sales service, about providing additional branded services to consumers who are highly individualized in their requests;

– simultaneously improve product quality and reduce costs. If earlier it was possible to offer the consumer a lower quality product at a lower price and, conversely, a high price always corresponded to high quality, today the situation has changed. A higher quality product should be provided at the expense of the same lower price.

Now in our country there is a situation where most of the population has a very modest income, and it is she who is a potential buyer of mass-produced footwear.

Solving the problems of style, marketing, advertising will allow domestic footwear of mass production to be demanded by this wide sector of the population of Russia. Small and medium-sized shoe enterprises should provide footwear to a more profitable part of the population, however, as well as highly automated production complexes.

In recent years, the absolute increase in the production of leather footwear has been constantly increasing, the range of footwear is being updated at shoe enterprises taking into account the demand of the population, the production of model and insulated footwear, footwear with white leather tops and genuine patent leather, smart shoes for children is increasing. The transition of the country's economy to market relations led to a sharp deterioration in the situation in the footwear industry in Russia due to a decrease in the effective demand of the population, deepening inflationary processes, a crisis of non-payments, which, in turn, caused an imbalance in production and circulation.

The footwear market is an integral element of economic relations, the main participants of which are, on the one hand, shoe manufacturers, and on the other, consumers. As a product in this market, footwear is one of the most complex groups of non-food products with a very diverse assortment.

Footwear is one of the most important goods produced by the light industry of the Russian Federation and imported from abroad. The degree of satisfaction of consumer demand, the profitability and profitability of organizations depend on the correct determination of the quantity and quality of models produced by shoe enterprises, on the competitiveness of the assortment. The result of the interaction of the constituent parts of the market (demand, supply, prices for shoes) is the possibility of supply to satisfy the demand for products at a specific price to the maximum extent possible.

Thus, the importance of the footwear market lies in meeting the needs of the population. Accordingly, the development of the market leads to an increase in the level of security of an individual member of society. Markets are made up of buyers, and buyers differ from each other in a variety of ways: according to their needs, financial and other capabilities, location, buying attitudes and buying habits. When segmenting a market, businesses divide large, heterogeneous markets into smaller (and more homogeneous) segments that can be served more efficiently, according to the specific needs of those segments. For the successful sale of manufactured products, shoe enterprises first of all need to segment the consumer market and determine the target segment of this market.

Main part

What is the main thing today for the success in the market of many new and long-standing firms, small, medium and large enterprises, many of which were not so long ago, for numerous commercial structures and joint ventures? This is the ability of the firm to provide the consumer with shoes of higher quality than before, and moreover, for the same or less price.

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Thus, the importance of the footwear market lies in meeting the needs of the population. Accordingly, the development of the market leads to an increase in the level of security of an individual member of society.Markets are made up of buyers, and buyers differ from each other in a variety of ways: according to their needs, financial and other capabilities, location, buying attitudes and buying habits. When segmenting a market, businesses divide large, heterogeneous markets into smaller (and more homogeneous) segments that can be served more efficiently, according to the specific needs of those segments. For the successful sale of manufactured products, shoe enterprises first of all need to segment the consumer market and determine the target segment of this market.

In a general sense, market segmentation refers to the process of dividing the market into groups of consumers according to predetermined criteria, which allows you to concentrate funds on the most effective. A market segment is a homogeneous set of consumers who react in the same way to a product and the way it is presented.

Target segment (market) - a segment selected as a result of market research for a particular product or service, characterized by minimal costs for means of promoting goods and providing the enterprise with the bulk of the result of its activities (profit or other criteria for the purpose of the enterprise entering this market). In a general sense, market segmentation refers to the process of dividing the market into groups of consumers according to predetermined criteria, which allows you to concentrate funds on the most effective. A market segment is a homogeneous set of consumers who react in the same way to a product and the way it is presented.

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Segmentation of the footwear market in the Southern Federal District and the North Caucasus Federal District can be carried out both on the basis of one or with the sequential use of several indicators, clearly presented in the diagram (Figure 1).

Results of segmentation of the analyzed basic footwear marketThe Southern and North Caucasian Federal Districts can be presented in the form of a table of ratings. The segment with the lowest total of seats is the most attractive.

Criteria for segmenting the footwear market in the Southern Federal District and the North Caucasus Federal District				
1	2	3	4	5
Subject segmentation	Segment object	Segmentation by size	Segmentation by level profitability	Segmentation to size average wages
All enterprises that produce or intend to produce footwear in the territories of the South and North Caucasian Federal constituencies	Southern and North Caucasian Federal Districts of the Russian Federation	The larger the population of the segment, the more profitable for the enterprise	The higher profitability of each resident, the greater the chance of purchasing the company's products	The higher the salary of a resident, the more likely he will spend it on shoes

Figure 1. - Criteria for segmenting the footwear market in the Southern Federal District and the North Caucasus Federal District

As a result of the analysis of the table, two regions and three regions were identified where the highest segmentation of the consumer market is observed from two districts: Krasnodar region - 2.15%, Rostov region - 2.65%, Astrakhan region - 2.7%, Volgograd region - 3, 25%, Stavropol Territory - 5.4%.

However, when performing segmentation, you need to consider the goals of the segmentation.

When creating new enterprises for the production of footwear, the five of these subjects of the Southern Federal District and the North Caucasus Federal District are not attractive in a competitive environment due to the successfully developed footwear production.

Table 1 - Results of segmentation of the consumer market of the Southern Federal District and the North Caucasus Federal District by the method of the sum of places, taking into account the weighting factors

Name territorial units	Ranking positions			Amount points,%
	profitability, score × 0.45	salary, score × 0.30	number, score × 0.25	
Southern Federal District, v. incl.				
Krasnodar region	1.8	0.6	0.25	2.65
Republic of Adygea	3.6	2.1	2.75	8.45
Republic of Kalmykia	4.95	2.4	3.25	10.6
Astrakhan region	0.9	0.3	1.5	2.7
Volgograd region	1.35	0.9	1.0	3.25
Rostov region	0.45	1,2	0.5	2.15
North Caucasian Federal District, incl.				
Republic of North Ossetia - Alania	2.25	3	2	7.25
Kabardino-Balkar Republic	2.7	3.6	1.75	8.05
The Republic of Dagestan	4.5	3.9	1.25	9.65
The Republic of Ingushetia	5.4	1.8	2.5	9,7
Karachay-Cherkess Republic	4.05	3.3	3	10.35
Stavropol region	3.15	1.5	0.75	5.4
Chechen Republic	5.85	2.7	2.25	10.8

As a result of segmentation, it was determined that the population of the two districts is unevenly distributed over the territory. The population's income is much lower than the average in Russia. When forming the range of footwear, one should also take into account the fact that a large share of the population is rural residents. It is also necessary to

take into account the national characteristics of the inhabitants, their traditions.

When organizing the sale of manufactured footwear, one should also remember that in the South and North Caucasian federal districts there were and remain so-called "hot spots", which are territories with a crisis in the economic situation and a negative political situation.

Correct definition of quality, consistency and systematic quality management give the manufacturer a decisive advantage in the competition for the consumer. It would seem that everything is simple, but simplicity is equally brilliant and deceiving. The general plan for solving the problem determines the vector of movement, sets the factorial priorities of the activity - no more.

A product made by man is dual in nature, it combines the natural properties of raw materials and the characteristics introduced into it by human labor. The product has a rental value and added value. In this context, it is not value that is important - it serves as a quantitative equivalent of the quality of a product in general, but the result of labor - in the form of a transformation of the natural state of an object. The product of human activity has a natural, basic, level and a superstructure, introduced. Hence the need for a dualistic perception of the quality of the product, which should not be interpreted primitively as a double quality. The quality of the product is the same, but the production duality of the product is associated with it.

Such two-sidedness of the quality of the product misleads those who, having not yet understood the art of dialectical thinking, strive to sort everything out “on the shelves”, forgetting about the structure of which these shelves are parts. The quality of a product is only determined by a natural basis, but it is built artificially.

Product quality has several creators. This is a fashion designer, constructor, technologist, manager; their qualifications and experience are measured without problems. Others are also within reach, only their measurement is difficult, especially when it comes to the consumer.

The economic situation affects both producers and consumers, shakes the market on the waves of its uneven movement, and together with purchasing power and perceptions of quality.

Outwardly, determining the quality of a product produced for sale on the market seems an impossible task, because for this it is necessary to combine not converging, but (mostly) diverging views. Krylov's Fish, Cancer and Pike are involuntarily recollected, who have undertaken to drag the cart. In our case, there are even more subjects.

The designer, technologist, manager develop their understanding of the quality of the goods (they can be combined), they are linked by the common interest of the manufacturer. The buyer has a special approach to quality. As a consumer, he is not sure about the integrity of the manufacturer. In addition, the buyer has his own tastes, reasons, conditioned by the real buying opportunity. There are also the interests of the market, which has become an independent subject of the economy. Speculation is legalized and attracts with its potential. By controlling the market, an intermediary - a speculator - is able to form an image of quality in his own interests, in particular, through advertising, giving priorities, etc. Finally, there is the quality of the product itself, expressed in the totality of properties of natural origin and added by the manufacturer. As a result, we came to the "quality square", combining product quality and quality image.

Anything common exists objectively, but only through a single one: at the end of the process, there is always a separate, concrete buyer Pyotr Stepanovich Sidorov and boots, which Pyotr Stepanovich chose from dozens of different ones. They seemed to him the best in quality and price. The sales assistant professionally explained to Petr Stepanovich that there are better quality boots in the same price range, but, being an independent person, he did not change his mind. This is why pre-sale preparation of products and the culture of the seller are important. The last word belongs to the buyer, his perception of the quality of the product. Everything else only plays up to him.

The most serious contradiction, apparently, remains the discrepancy in the images of product quality between the manufacturer and the consumer. The special importance of a different approach to the quality of the manufacturer and the consumer is natural. They are the main subjects of the system of economic relations, they have a common goal - a product. The former make it, the latter consume it, but they have different motives due to their different position in the system and the culture of target perception.

The manufacturer creates a product, but not a product - the ultimate goal of the manufacturer, but the sale of the product. The direct connection between the producer and the consumer is local because it has a negative effect on the producer. The seller blocks the consumer from the manufacturer, and the manufacturer is forced to focus not on the market, but on the market situation, which is most often artificially formed by the speculator and advertising.

Money, perhaps, does not "smell", advertising policy frankly "stinks", it is so far from objectivity and free from professional honor. Being in a state of irresponsibility for information, advertising serves the market clearly and in any form.

The manufacturer, unlike the seller, is responsible for information both by law and by his professional reputation. The seller manipulates the information as he sees fit - the manufacturer is

constrained by responsibility, moreover, the market often dictates the rules of relations to him.

When creating new enterprises for the production of footwear, the five of these subjects of the Southern Federal District and the North Caucasus Federal District are not attractive in a competitive environment due to the successfully developed footwear production.

As a result of segmentation, it was determined that the population of the two districts is unevenly distributed over the territory. The population's income is much lower than the average in Russia. When forming the range of footwear, one should also take into account the fact that a large share of the population is rural residents. It is also necessary to take into account the national characteristics of the inhabitants, their traditions.

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Conclusion

Assortment formation - the problem of specific goods, their individual series, determining the relationship between "old" and "new" goods, goods of single and batch production, "high technology" and "conventional" goods, materialized goods and (or) licenses and know-how ". When forming the assortment, problems of prices, quality, guarantees, service arise, whether the manufacturer is going to play the role of a leader in creating fundamentally new types of products or is forced to follow other manufacturers.

Assortment formation is preceded by the development of an assortment concept by the enterprise. It is a directed construction of an optimal assortment structure, a product offer, while, on the one hand, the consumer requirements of certain groups (market segments) are taken as a basis, and on the other, the need to ensure the most efficient use of raw materials, technological, financial and other resources by the enterprise from in order to produce products at low costs.

The assortment concept is expressed in the form of a system of indicators characterizing the possibilities of optimal development of the production assortment of a given type of goods. These indicators include: a variety of types and varieties of goods (taking into account the typology of consumers); level and frequency of assortment renewal; the level and ratio of prices for goods of this type, etc.

The assortment formation system includes the following main points:

– determination of current and future needs of buyers, analysis of the ways of using shoes and peculiarities of buying behavior in the relevant market;

– assessment of existing competitors' analogues;

– a critical assessment of the products manufactured by the enterprise in the same range, but from the point of view of the buyer;

– deciding which products should be added to the range and which ones should be excluded from it due to changes in the level of competitiveness; whether it is necessary to diversify products at the expense of other areas of the enterprise's production that go beyond its established profile;

– consideration of proposals for the creation of new models of footwear, improvement of existing ones;

– development of specifications for new or improved models in accordance with the requirements of buyers;

– exploring the possibilities of producing new or improved models, including questions of prices, costs and profitability.

But one thing is true: this is a constant evaluation and revision of the entire range.

In conclusion, I would like to once again draw your attention to the fact that all this will become a reality if one condition is implemented, namely, the products of the light industry will be produced of high quality and taking into account the interests of this very consumer.

What's the solution for the manufacturer? There is only one way out - a direct presence in the market and significant investments in education and education of consumers. It is difficult to overcome such a program alone, uniting is absolutely real. The domestic manufacturer has everything it needs to oust the speculator from the retail market. He has professional experience, qualified personnel, scientific and technical support, a certain confidence of buyers returning to the old, pre-reform priorities, which are actively exploited by unscrupulous manufacturers and to which the authorities shyly shut their eyes, which does not want to return to the Soviet experience. Confectioners, meat-makers, winemakers shamelessly use Soviet brands, replacing them with surrogates. The brands of Vyatka, Orenburg, Ivanovo, some Moscow and Leningrad enterprises are returning to the market. The tendency to return interest is gaining stability. Of course, clothes and shoes are not sausages and vodka or chocolate and confectionery products of natural origin.

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ON THE ADVANTAGE OF USING PRODUCTION IN THE MANUFACTURE OF DEMANDED AND COMPETITIVE PRODUCTS, MESSAGE 2

Abstract: *The article explores the possibility of forming innovative technological processes on the basis of universal and multifunctional dual-purpose equipment, namely: the production of men's shoes and the entire assortment of footwear for children. For the first time, the authors managed to solve this problem on the basis of a single design basis, using a generalized feature - the height of the heel elevation. This solution guarantees the manufacturer stable technical and economic indicators of its activities, and consumers - to meet the demand for demanded footwear.*

Key words: *constructive basis, versatility, multifunctionality, demand, demand, price niche, markets with unstable sales.*

Language: *English*

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Introduction

UDC 685.14: 519. 78.

To select the optimal capacity, the authors have developed software that allows manufacturers, based on an innovative technological process using universal and multifunctional equipment, to produce the entire assortment of shoes with minimum, average and maximum costs, which creates the basis for varying the price niche, including through a gradual increase in the share of domestic components in the production of leather goods with a significant reduction in the cost of its manufacture. At the same time, as criteria for a reasonable choice of the optimal power when forming the algorithm, it was justified to choose exactly those criteria that have the greatest impact on the cost of the finished product, namely:

– load factor of workers,%;
– labor productivity of one worker, a couple;
– losses on wages per unit of production, rubles;

– specific reduced costs per 100 pairs of shoes, rub.

Of the four given criteria, in our opinion, the main ones are labor productivity of 1 worker and unit reduced costs.

Labor productivity of 1 worker is the most important labor indicator. All the main indicators of production efficiency and all labor indicators, to one degree or another, depend on the level and dynamics of labor productivity: production, the number of employees, wage expenditure, the level of wages, etc.

To increase labor productivity, the introduction of new equipment and technology, widespread mechanization of labor-intensive work, automation of production processes, advanced training of workers and employees, especially when introducing innovative technological processes based on universal and multifunctional equipment, are of paramount importance.

Main part

Specific reduced costs - an indicator of the comparative economic efficiency of capital investments, used when choosing the best option for solving technological problems.

The given costs are the sum of current costs, taken into account in the cost of production, and one-time capital investments, the comparability of which with current costs is achieved by multiplying them by the standard coefficient of efficiency of capital investments. Tables 1 and 2 show the calculations of the optimal power for the range from 300 to 900 pairs for men's and women's shoes for the entire range of footwear. Analysis of the obtained characteristics for three variants of a given technological process in the manufacture of the entire assortment of footwear confirmed the effectiveness of the software product for evaluating the proposed innovative technological process using universal and multifunctional equipment. So, with a range of 300 - 900 pairs, the best according to the given criteria is the volume of production of 889 pairs (for men) and 847 pairs (for women). If the production areas proposed by the regional and municipal authorities of the two districts - the Southern Federal District and the North Caucasus Federal District, according to the standard indicators, do not allow the calculated production volumes to be realized, then the option of the optimal capacity is chosen that is acceptable, for example, the production volume of 556 pairs, which corresponds to the standard indicators for the proposed production areas and is characterized by the best values of the designated criteria, which form the cost of the entire range of footwear. The authors have developed consolidated technological processes for assembling a shoe upper and assembling shoes for 12 models of men's and 12 models of women's shoes, respectively. The generalized volumes of the main costs are shown in table 1.

Table 1. - Calculation of the optimal power with a range of 300-900 pairs using the example of men's shoes

Power	Equipment type	Optimal power, steam per shift	Manufacturing labor efficiency of 1 worker, pairs	Workers load factor,%	Losses on wages per unit of production, rub	Specific reduced costs per 100 pairs of shoes, rub
300-500	1	500	28.09	61.39	13.68	6735.36
500-700	1	556	27.73	69.14	9.83	6404.71
700-900	1	889	28.09	77.20	6.42	5236.17
300-500	2	500	28.09	61.39	13.68	6728.68
500-700	2	556	27.91	68.70	9.97	6083.28
700-900	2	889	28.09	77.20	6.42	5240.72
300-500	3	500	28.09	61.39	13.68	7533.95
500-700	3	700	28.12	67.28	10.56	6734.02
700-900	3	889	28.09	77.20	6.42	5876.59

To assess the effectiveness of the production activity of a shoe company, it is necessary to analyze the annual results of the enterprise for the production of men's and women's shoe assortment.

Table 2. - Calculation of the optimal power with a range of 300-900 pairs using the example of women's shoes

Power options	Type of equipment	Optimal power, steam per shift	Performance labor of 1 worker, couples	Workers load factor,%	Losses on wages per unit of production, rub	Specific reduced costs per 100 pairs of shoes, rub
300-500	1	500	27.73	62.18	13.40	6980.5
500-700	1	700	27.73	69.14	9.83	6277.43
700-900	1	847	27.73	74.50	7.54	5673.49
300-500	2	500	24.45	63.90	14.11	7630.92
500-700	2	556	27.73	69.14	9.83	6404.71
700-900	2	812	25.64	75.40	7.77	6060.55
300-500	3	500	27.00	61.74	14.02	7827.12
500-700	3	556	29.32	68.21	9.71	6607.65
700-900	3	847	27.00	74.70	7.66	6341.05

These calculations indicate that with 100% of sales of men's and women's shoes in the specified period of time, not only the costs of production and sales of products are covered, but also a profit of 3,697.4 thousand rubles remains. This testifies to the efficient operation of the enterprise, as well as to the correct marketing and assortment policy. The product profitability is 14.9%.

Shoe enterprises should focus both on external (consumer enterprises, competition, market conditions, etc.) and on internal factors, such as sales volume, profitability, coverage of basic costs, etc. However, it is impossible to take into account and foresee all situations that may arise when selling shoes, i.e. some shoe models are no longer in demand at a certain stage.

Thus, the regions where innovation centers, including shoe centers, are organized, become leaders in economic development, determine the competitiveness of the economy of these regions, and provide social protection to the population of these regions.

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ABOUT THE CRITERIA FOR THE JUSTIFIED USE OF MATERIALS FOR THE PRODUCTION OF THE SUIT FOR THE MILITARY SERVICES OF THE ARCTIC

Abstract*: In the article, research has been carried out on the creation of a jacket for protection from the cold of a serviceman in the Arctic. The basis for the creation of thermal protective clothing for operation should be based on a scientific principle that takes into account the physiology of heat exchange between humans and the environment.When developing thermal protective clothing, the requirements for thermal insulation of all areas of the body should be met. The packages of materials were selected in accordance with the requirements for thermal protective clothing and the materials used for its manufacture.*

Key words*: suit, serviceman, Arctic, heat-protective jacket, package of materials, physical-mechanical and thermophysical characteristics of materials, criteria for a reasonable choice of materials.*

Language*: English*

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Introduction

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Criteria for a reasonable choice of a package of materials for the production of a suit for servicemen in the Arctic were chosen as the object of the study. At the same time, preferences will be clarified that would guarantee them comfortable conditions in the performance of their official duties.

Main part

When choosing packages of materials for research, we took into account the physical and mechanical, thermophysical characteristics of

materials, information about the specifics of the operation of this clothing, which were obtained by us from open literature sources.

A feature of the reasonable choice of packages of materials for a suit for servicemen in the Arctic is the fact that they must provide him not only with a comfortable state due to a guaranteed temperature regime of the clothing space of at least 340C, but also meet all the requirements for the manufacture of heat-protective clothing.

For the study, packages of both imported polymeric materials for the production of jackets and packages of domestic polymeric materials were considered, which were evaluated for their satisfaction with the requirements for heat-protective clothing when military personnel are in climatic zones with temperatures from -200C to -400C.

The results of previous studies using a software product developed by the authors for a reasonable choice of a package of materials in the manufacture of a suit for servicemen in the Arctic showed that at the initial weighted average surface temperature of a soldier of + 360C for all packages of materials using both domestic polymer materials and imported polymer materials, a sharp drop in body temperature is observed at an air temperature from -200C to -400C, provoking a feeling of discomfort within the first hour of their stay in these conditions, which involves the search for new materials that would guarantee them a comfortable state for at least two hours. Table 1 shows the characteristics of the package of imported polymer materials for the production of jackets, and Table 2 shows the characteristics of the package of domestic polymer materials. The packages of materials were selected in accordance with the requirements for thermal protective clothing and the materials used for its manufacture. When compiling the packages, the purpose of each layer and the thermophysical characteristics of the materials were taken into account.

Domestic hot-melt interlining materials (TKPM), the characteristics of which are given in Tables 1 and 2, will find the greatest application in the manufacture of a suit for servicemen in the Arctic.

Table 1 - Characteristics of a package of imported polymeric materials for the production of a jacket

Model	Package materials	Thickness, mm	Coefficient of thermal conductivity λ, W / m ºC
Model 1	Synthetic fabric (100% PE)	1.6	0.042
	Insulation Promaloft (main) Gasket materials: 1. TKPM "Picardy" 1242 \ 17 2. TKPM "Kufner" R171G57 3. TKPM "Kufner" B141N77 4. TKPM AKR-622 \ AKR218	12.0 1,2 1,3 2.1 3.5	0.034 0.041 0.031 0.021 0.009
	Lining fabric	0.76	0.039
Model 2	Synthetic fabric (100% PE)	1.6	0.042
	Insulation "Hollofan" 2 layers basic Gasket materials: 1. TKPM "Picardy" 1242 \ 17 2. TKPM "Kufner" R171G57 3. TKPM "Kufner" B141N77 3. TKPM AKR-622 \ AKR218	12.0 1,2 1,3 2.1 3.5	0.036 0.041 0.031 0.021 0.009
	Lining fabric	0.76	0.039
Model 3	Synthetic fabric (100% PE)	1.6	0.042
	Insulation "Kombisherst" "250 + 150" basic Gasket materials: 1. TKPM "Picardy" 1242 \ 17 2. TKPM "Kufner" R171G57 3. TKPM "Kufner" B141N77 3. TKPM AKR-622 \ AKR218	12.0 1,2 1,3 2.1 3.5	0.33 0.041 0.031 0.021 0.009
	Lining fabric	0.76	0.039

Each material from the compiled bags meets the requirements for the manufacture of thermal protective clothing.

The difficulty in compiling the package was the lack of information on a number of materials. Therefore, packages of materials for models No. 1- No. 3 are made up of the most famous imported materials, and packages No. 1 * - No. 3 * are made up of materials of domestic production.

The difficulty in choosing a package of materials also lies in the fact that when choosing the materials used for a specific product, it is necessary to take into account the region in which these products will be used, since specific products will be subjected to different operating conditions in relation to climatic zones. This is especially true for heat-protective clothing used in the Arctic.

Table 2 - Characteristics of a package of domestic polymeric materials for the production of jackets.

Model	Package materials	Thickness, mm	Coefficient of thermal conductivity λ, W / m ºC
1	2	3	4
Model 1	Membrane fabric	3.5	0.06
	Sintepon (100% PE) basic	15	0.035
	Gasket materials:		
	1. TKPM "Picardy" 1242 \ 17	1,2	0.041
	2. TKPM "Kufner" R171G57	1,3	0.031
	3. TKPM "Kufner" B141N77	2.1	0.021
	4. TKPM AKR-622 \ AKR218	3.5	0.009
	Fleece	1,2	0.039
Model 2	PE fabric (art. 06617-kv)	2.1	0.040
	Insulation Termofinn Micro basic	15	0.036
	Gasket materials:		
	1. TKPM "Picardy" 1242 \ 17	1,2	0.041
	2. TKPM "Kufner" R171G57	1,3	0.031
	3. TKPM "Kufner" B141N77	2.1	0.021
	4. TKPM AKR-622 \ AKR218	3.5	0.009
	Viscose-complex lining fabric	0.6	0.044
Model 3	Blended fabric (67% PE + 33% CL)	1.8	0.041
	Wool stitched fabric 2 layers (80% PE + 20% wool) main	twenty	0.038
	Gasket materials:		
	1. TKPM "Picardy" 1242 \ 17	1,2	0.041
	2. TKPM "Kufner" R171G57	1,3	0.031
	3. TKPM "Kufner" B141N77	2.1	0.021
	4. TKPM AKR-622 \ AKR218	3.5	0.009
	Lining fabric art. 32013	0.69	0.049

Let us repeat and name the main criteria for the comfort of clothes: the temperature of the skin, which should not be lower than 33.3 ° C, and the temperature of the underwear space should be at least 34 ° C, that is, the microclimate of the underwear space is an indicator of its comfort, including when exposed to low temperatures. For a person, it is not indifferent which part of the body is cooled more while maintaining the total heat transfer, for example, strong cooling of the legs cannot be fully compensated by heating another part of the body without disturbing the person's sense of comfort. Therefore, it was so important to develop a mathematical model to justify the choice of a package of materials in order to create comfort for a serviceman, taking into account the duration of exposure to low temperatures.

The concept of the mathematical model is based on the representation of clothing as a set of multilayer packages of materials of various shapes and compositions.

To calculate the temperature distribution, the authors used the Maple mathematical packages.

The solution to the problem was reduced to finding such a combination of materials for the package, which would realize a minimum of heat flux from its surface while limiting the volume of the package. Thus, we can conclude that using the proposed mathematical model, it is possible to optimize the choice of materials for the manufacture of a heat-protective suit.

Consider the temperature distribution problem T_i i - th layer in the details of the suit, which is a

cylindrical multilayer surface. The ambient temperature is kept constant, equal to T_0 ... The heat flux of density comes from the body to the inner surface of the garment q ... On the outer surface of clothing, heat exchange with the environment occurs according to Newton's law with a heat transfer coefficient α.

Let us introduce the following notation for the basic criteria:

t - time; $T_i(r,t)$ - temperature i-th layer; λ_i - coefficient of thermal conductivity i-th layer; α_i - coefficient of thermal diffusivity i-th layer; R_{i-1}, R_i - inner and outer radii i-th layer; $i = 1,2...n$.

Now consider n-layered hollow cylinder and boundary value problem

$$\frac{\partial T_i}{\partial t} = a_i \frac{1}{r}\frac{\partial}{\partial r}\left(r\frac{\partial T_i}{\partial r}\right), \; R_{i-1} < r < R_i \quad i = 1,2...n. \; (1)$$

With boundary conditions:

$$\lambda_1 \frac{\partial T_1}{\partial r}(R_0,t) + q = 0;$$

$$\lambda_n \frac{\partial T_n}{\partial r}(R_n,t) + \alpha\left(T_n(R_n,t) - T_0\right) = 0; \; (2)$$

Ideal contact is assumed between the layers:

$$T_{i-1}(R_{i-1},t) = T_i(R_{i-1},t);$$

$$\lambda_{i-1}\frac{\partial T_{i-1}}{\partial r}(R_{i-1},t) = \lambda_i \frac{\partial T_i}{\partial r}(R_{i-1},t), \; i = 2,..,n. \; (3)$$

Initial conditions

$$T_i(r,0) = \phi_i(r), i = 1,..,n. \; (4)$$

Solving the problem, it is possible to find the temperature distribution in the layers of the suit and, in particular, the change in the temperature of the underwear space depending on time.

The passage of heat through a multilayer spherical wall is described by a system of heat conduction equations:

$$\frac{\partial T_i(r_i,t)}{\partial t} = a_i \frac{1}{r_i}\frac{\partial^2\left(r_i T_i(r_i,t)\right)}{\partial r_i^2}, \; (5)$$

$R_{i-1} \le r_i \le R_i$, Where R_{i-1}, R_i - inner and outer radii i-th layer,

t-time, a_i-thermal diffusivity i-th layer, $(i = 1,..,n)$.

The heat flux of density arrives on the inner surface of the ball segment from the foot q:

$$\lambda_1 \frac{\partial T_1}{\partial r_1}(R_0,t) + q = 0. \; (6)$$

On the outer surface of the body, heat exchange with the environment occurs according to Newton's law with the heat transfer coefficient α:

$$\lambda_n \frac{\partial T_n}{\partial r_n}(R_n,t) + \alpha\left(T_n(R_n,t) \quad T_c\right) = 0. \; (7)$$

We will assume that there is an ideal contact between the layers, which is expressed by the following relations:

$$T_{i-1}(R_{i-1},t) = T_i(R_{i-1},t),$$
$$\lambda_{i-1}\frac{\partial T_{i-1}}{\partial r_{i-1}}(R_{i-1},t) = \lambda_i \frac{\partial T_i}{\partial r_i}(R_{i-1},t), \; (8)$$

$i = 2,..,n$. At the initial moment of time, the temperature is set

$$T_i(r_i,0) = \phi_i(r_i), \; (9)$$

$$i = 1,..,n \; ...$$

Thus, the process of heat passage through the spherical segment from the body to the outer surface is described by the boundary value problem with the initial conditions given above.

When calculating, we took into account the following criteria:

- the thickness of the layers of materials in the package;
- coefficient of thermal conductivity and thermal diffusivity of package materials;
- the density of the heat flow coming from the body;
- ambient temperature;
- initial temperature of the package of materials;
- coefficient of heat transfer from the outer surface of the package to the environment;
- the presence of an additional layer in the form of thermal underwear and a woolen sweater.

When calculating, it was also taken into account that a person has guaranteed thermal protection of legs, arms and head, that is, he is dressed in accordance with climatic conditions.

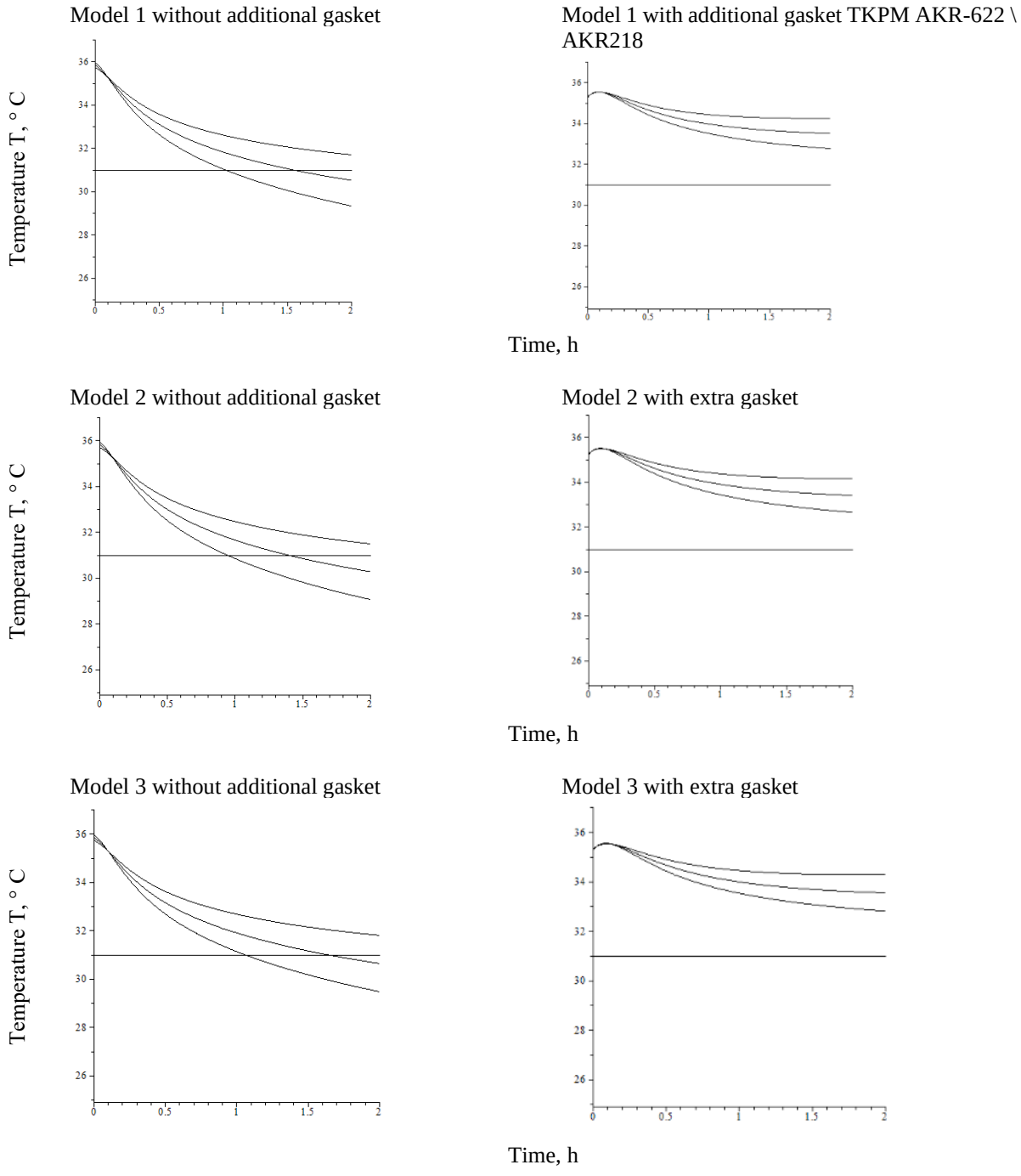

Figure 1 - The results of calculating the weighted average skin temperature for bags consisting of imported materials at ambient temperatures: curve 1 -20 ° C, curve 2 - 30 ° C, curve 3 - 40 ° C.

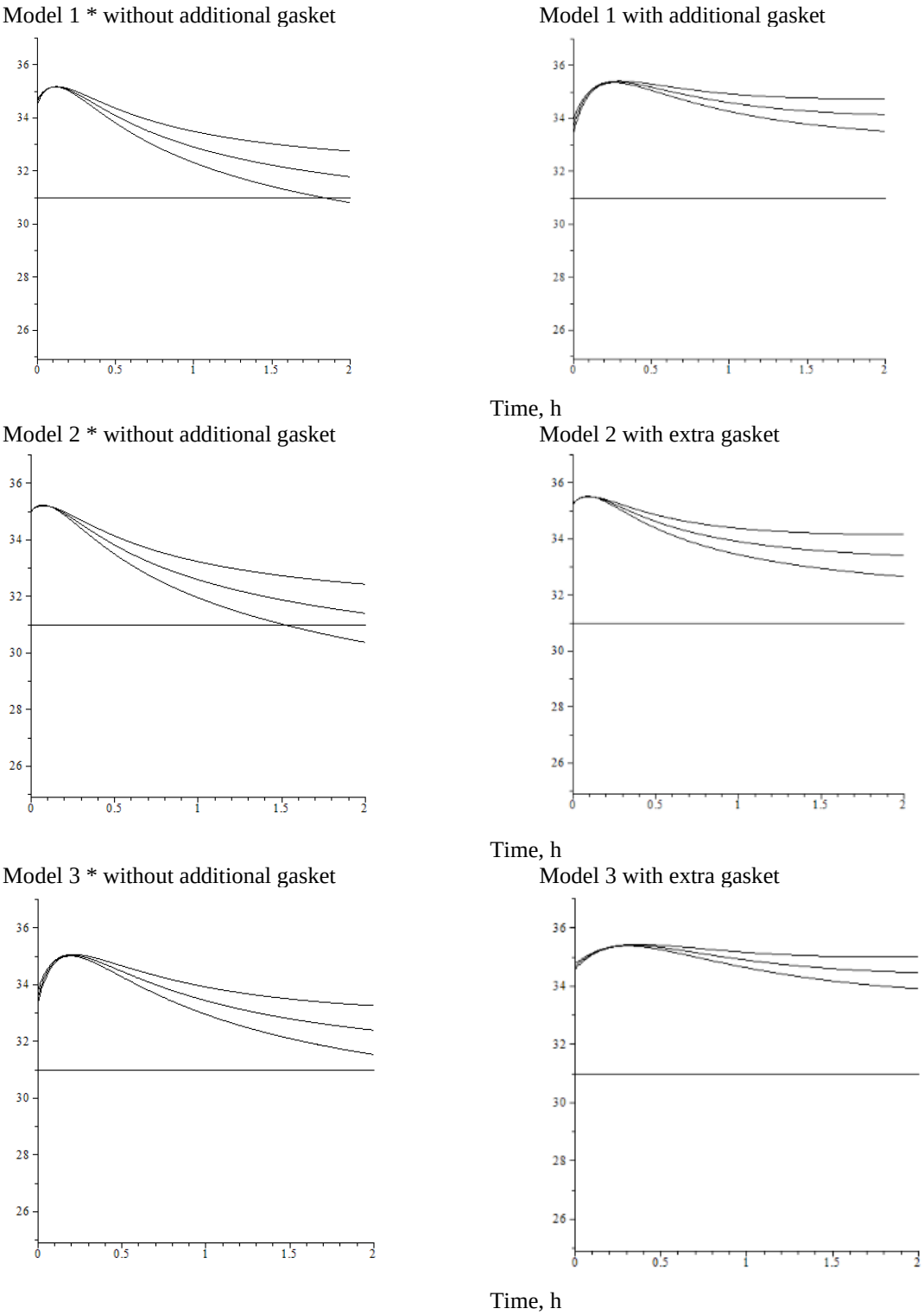

Figure 2 - The results of calculating the weighted average skin temperature for bags consisting of domestically produced materials at ambient temperatures: curve 1 -20 ° C, curve 2 - 30 ° C, curve 3 - 40 ° C.

The calculation results are presented in Figure 1 for imported materials and in Figure 2 for domestically produced materials. These figures show the dependence of the weighted average temperature of the human body on the time spent at low temperatures (from -20 ° C to -40 ° C). It can be seen from the above figures that at an initial weighted average skin temperature of 36 ° C for all packages of materials, a sharp drop in body temperature is observed at an air temperature from -20 ° C to -40 ° C.

Conclusion

Analysis of the research results confirmed the justification of using TKPM as cushioning materials

in the manufacture of a suit for servicemen of the Arctic, since with all TKPM, the comfort of a serviceman is provided for 2 hours of his stay in climatic zones with an ambient temperature of -20 ° C and -30 ° C, but comfortable conditions when it is in the climatic zone at -40 ° C is provided only with the use of TKPM AKR-622 / AKR218, the thermal conductivity coefficient of which is the smallest, namely λ = 0.009W / m · ° C.

The authors have proved that the main criterion for the comfort of a suit of servicemen in the Arctic when they are in different climatic zones is the thermal conductivity coefficient. The possibility of using a software product to justify the choice of material packages for a suit of servicemen in the Arctic in various climatic zones has been confirmed. A high coincidence of the calculated values of heat loss from the surface of the tested jackets with the experimental data has been achieved, which confirms the legitimacy of using the software product developed by the authors for the justified choice of material packages for the suit of the Arctic military personnel located in different climatic zones.

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ON THE CRITERIA FOR THE JUSTIFICATION OF THE USE OF MATERIALS FOR THE PRODUCTION OF THE SUIT FOR THE MILITARY SERVICES OF THE ARCTIC WITH THE HELP OF THE DEVELOPMENT OF INDUSTRIAL SUPPORT

Abstract: *Research has been carried out to create a jacket to protect a serviceman from the cold in the Arctic. The basis for the creation of thermal protective clothing for operation in the Arctic should be based on a scientific principle that takes into account the physiology of heat exchange between humans and the environment. When developing thermal protective clothing, the requirements for thermal insulation of all areas of the body should be met. The packages of materials were selected in accordance with the requirements for thermal protective clothing and the materials used for its manufacture. When compiling the packages, the purpose of each layer and the thermophysical characteristics of the materials were taken into account. The materials must meet the criteria that would provide the servicemen with their comfort. The possibilities of the software mathematical editor MAPLE for a reasonable choice of a package of materials for the production of a comfortable suit for Arctic military personnel, as well as the entire range of related products of accessories, to ensure their comfortable conditions when performing their tasks, are considered.*

Key words: *suit, serviceman, in the Arctic, heat-protective jacket, package of materials, nanotechnology, nanomaterials, physical-mechanical and thermophysical characteristics of materials, criteria for a reasonable choice of materials, accessories, suit, comfort, climatic zones, heat-mass transfer.*

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Introduction

UDC 685.34: 317.54

Criteria for a reasonable choice of a package of materials for the production of a suit for servicemen in the Arctic were chosen as the object of the study. At the same time, preferences will be clarified that would guarantee them comfortable conditions in the performance of their official duties. "Ratnik" is a

Russian military equipment of a serviceman, also referred to as a "set of the soldier of the future." "Warrior" is part of a general project to improve the quality of an individual soldier on the battlefield by using the latest scientific advances in navigation, night vision systems, tracking the psychophysiological state of a soldier, using advanced materials in the manufacture of armor and clothing fabrics. The system is a complex of modern means of protection, communications, weapons and ammunition. Research and development work was carried out by dozens of Russian defense enterprises, such as FSUE TsNIITOCHMASH, NPO Spetstekhnika i svyaz, OAO TsNII Tsiklon, NPO Spetsmaterialov, Tchaikovsky Textile and others. The general designer of the Ratnik equipment is Vladimir Nikolaevich Lepin. As conceived by the creators, the new equipment will be able to compete on equal terms with similar models of equipment of the "soldiers of the future". The "Warrior" includes about 10 subsystems. According to the first deputy chairman of the Military-Industrial Commission established under the government of the Russian Federation - Russia, Yuri Borisov, this kit will have a modular layout and will be adapted to operate in a variety of conditions and at any time of the day.

The "Ratnik" includes several dozen items of weapons, including:

– aramid overalls made of Alyutex fiber of the Kamenskvolokno company, capable of withstanding the hit of fragments of grenades, mines or shells, and also has a certain fire resistance;

– the protection kit includes 6B43 body armor (with ceramic plates) of protection class 6A according to GOST R 50744-95 (adopted in 2002) or Br5 class according to the new GOST R 50744-95 (adopted in 2014, is the main one): in an extended configuration (weight up to 15 kg) or as standard (weight up to 9 kg) - without groin protection (armor plate and anti-splinter module), bulletproof side armor plates, shoulder pads (anti-splinter module). The kit also includes a multi-layer helmet that can withstand the hit of a pistol bullet (protection class 1) from a distance of 5-10 meters.

– the set is equipped with the "Strelets" control system, which includes means of communication, target designation, processing and display of information, identification, which allows transmitting information about the soldier's location to the command post;

– a communicator that determines the coordinates of a serviceman using GLONASS and GPS, to solve the problem of orientation on the ground and target designation and other applied calculations;

– power supply kits;

– safety goggles capable of withstanding 6 mm shrapnel flying at a speed of 350 m / s;

– shields for knee and elbow joints;

– water purification filters, autonomous heat sources;

– automatic, or machine gun, or sniper rifle, equipped with a night vision sight and thermal imaging aiming system;

– video module for shooting from cover. Consists of a thermal imaging sight and a helmet-mounted monitor with a control system, on which an image from the sight is displayed (developed at JSC TsNII "Cyclone", which is part of the holding "Ruselectronics");

– several types of thermal imaging sights - 1PN139 (large-caliber), 1PN140 (for normal observation) and an option for reconnaissance (no name). Developed at TsNII "Cyclone", which is part of the holding "Ruselectronics";

– thermal imaging sight "Shahin" - provides detection, recognition and aimed fire at targets at any time of the day in a simple and complex meteorological environment;

– day-night sighting system (DNPK) for small arms, including a collimator sight (KP) 1P87, night monocular (NM) - 1PN138, a telescope (ZT) - 1P90 and a laser designator (LC) - 1K241. DNPK allows you to significantly increase the effectiveness of hitting targets from small arms, when using a night monocular with a collimator sight or a laser designator - to conduct aimed fire at dusk and in low light conditions. The 3X scope can also be mounted on the weapon in addition to the scope.

– the life support system includes backpacks of various types (universal backpack with a volume of 50 liters, a raid knapsack of 10 liters; a 24 kg unloading vest with interchangeable quick-detachable elements), camouflage kits, a folding heat-insulating pad, a removable insulation for use in winter, a ventilated T-shirt, a vest with compartments for ammunition, a mat, a raincoat, a hat, a comforter, a mosquito net;

– tent, sleeping bag;

– frost-resistant rechargeable battery for powering electronic devices. Multiple batteries can be connected. The modular charger allows you to charge from virtually all AC and DC sources. One battery can withstand 12-14 hours of active work;

– active headphones that allow you to communicate during the battle;

– knife "Bumblebee".

Thus, the formation of the basic requirements for the heat-shielding properties of packages of materials for a suit will allow manufacturers to produce a rational assortment of camouflage clothing and footwear for servicemen in the Arctic.

Main part

When choosing packages of materials for research, we took into account the physical and mechanical, thermophysical characteristics of

materials, information about the specifics of the operation of this clothing, which were obtained by us from open literature sources.

A feature of the reasonable choice of packages of materials for a suit for servicemen in the Arctic is the fact that they must provide him not only with a comfortable state due to a guaranteed temperature regime of the clothing space of at least 340C, but also meet all the requirements for the manufacture of heat-protective clothing.

For the study, packages of both imported polymeric materials for the production of jackets and packages of domestic polymeric materials were considered, which were evaluated for their satisfaction with the requirements for heat-protective clothing when military personnel are in climatic zones with temperatures of -200C, -30C and -400C. The results of previous studies using a software product developed by the authors for a reasonable choice of a package of materials in the manufacture of a suit for servicemen in the Arctic showed that at the initial weighted average surface temperature of a soldier of + 360C for all packages of materials using both domestic polymer materials and imported polymer materials, a sharp drop in body temperature is observed at an air temperature of -200C, -30C and -400C, provoking a feeling of discomfort within the first hour of their stay in these conditions, which implies the search for new materials that would guarantee them a comfortable state for at least two hours. Table 1 shows the characteristics of the package of imported polymer materials for the production of jackets, and Table 2 shows the characteristics of the package of domestic polymer materials. The packages of materials were selected in accordance with the requirements for thermal protective clothing and the materials used for its manufacture. When compiling the packages, the purpose of each layer and the thermophysical characteristics of the materials were taken into account.

Domestic hot-melt interlining materials (TKPM), the characteristics of which are given in Tables 1 and 2, will find the greatest application in the manufacture of a suit for servicemen in the Arctic.

Table 1 - Characteristics of a package of imported polymeric materials for the production of a jacket

Model	Package materials	Thickness, mm	Coefficient of thermal conductivity λ, W / m ºC
1	2	3	4
Model 1	Synthetic fabric (100% PE)	1.6	0.042
	Insulation Promaloft (main) Gasket materials: 1. TKPM "Picardy" 1242 \ 17 2. TKPM "Kufner" R171G57 3. TKPM "Kufner" B141N77 4. TKPM AKR-622 \ AKR218	 12.0 1,2 1,3 2.1 3.5	 0.034 0.041 0.031 0.021 0.009
	Lining fabric	0.76	0.039
Model 2	Synthetic fabric (100% PE)	1.6	0.042
	Insulation "Hollofan" 2 layers basic Gasket materials: 1. TKPM "Picardy" 1242 \ 17 2. TKPM "Kufner" R171G57 3. TKPM "Kufner" B141N77 3. TKPM AKR-622 \ AKR218	 12.0 1,2 1,3 2.1 3.5	 0.036 0.041 0.031 0.021 0.009
	Lining fabric	0.76	0.039
Model 3	Synthetic fabric (100% PE)	1.6	0.042
	Insulation "Kombisherst" "250 + 150" basic Gasket materials: 1. TKPM "Picardy" 1242 \ 17 2. TKPM "Kufner" R171G57 3. TKPM "Kufner" B141N77 3. TKPM AKR-622 \ AKR218	 12.0 1,2 1,3 2.1 3.5	 0.33 0.041 0.031 0.021 0.009
	Lining fabric	0.76	0.039

Table 2 shows the characteristics of a package of domestic polymeric materials for the production of a jacket.

Table 2 - Characteristics of a package of domestic polymeric materials for the production of jackets.

Model	Package materials	Thickness, mm	Coefficient of thermal conductivity λ, W / m ºC
1	2	3	4
Model 1	Membrane fabric	3.5	0.06
	Sintepon (100% PE) basic	15	0.035
	Gasket materials:		
	1. TKPM "Picardy" 1242 \ 17	1,2	0.041
	2. TKPM "Kufner" R171G57	1,3	0.031
	3. TKPM "Kufner" B141N77	2.1	0.021
	4. TKPM AKR-622 \ AKR218	3.5	0.009
	Fleece	1,2	0.039
Model 2	PE fabric (art. 06617-kv)	2.1	0.040
	Insulation Termofinn Micro basic	15	0.036
	Gasket materials:		
	1. TKPM "Picardy" 1242 \ 17	1,2	0.041
	2. TKPM "Kufner" R171G57	1,3	0.031
	3. TKPM "Kufner" B141N77	2.1	0.021
	4. TKPM AKR-622 \ AKR218	3.5	0.009
	Viscose-complex lining fabric	0.6	0.044
Model 3	Blended fabric (67% PE + 33% CL)	1.8	0.041
	Wool stitched fabric 2 layers (80% PE + 20% wool) main		
	Gasket materials:	20	0.038
	1. TKPM "Picardy" 1242 \ 17	1,2	0.041
	2. TKPM "Kufner" R171G57	1,3	0.031
	3. TKPM "Kufner" B141N77	2.1	0.021
	4. TKPM AKR-622 \ AKR218	3.5	0.009
	Lining fabric art. 32013	0.69	0.049

Each material from the compiled bags meets the requirements for the manufacture of thermal protective clothing.

The difficulty in compiling the package was the lack of information on a number of materials. Therefore, packages of materials for models No. 1- No. 3 are made up of the most famous imported materials, and packages No. 1 * - No. 3 * are made up of materials of domestic production.

The difficulty in choosing a package of materials also lies in the fact that when choosing the materials used for a specific product, it is necessary to take into account the region in which these products will be used, since specific products will be subjected to different operating conditions in relation to climatic zones. This is especially true for heat-protective clothing used in the Arctic.

Let us repeat and name the main criteria for the comfort of clothes: the temperature of the skin, which should not be lower than 33.3 ° C, and the temperature of the underwear space should be at least 34 ° C, that is, the microclimate of the underwear space is an indicator of its comfort, including when exposed to low temperatures. For a person, it is not indifferent which part of the body is cooled more while maintaining the total heat transfer, for example, strong cooling of the legs cannot be fully compensated by heating another part of the body without disturbing the person's sense of comfort. Therefore, it was so important to develop a mathematical model to justify the choice of a package of materials in order to create comfort for a serviceman, taking into account the duration of exposure to low temperatures.

The concept of the mathematical model is based on the representation of clothing as a set of multilayer packages of materials of various shapes and compositions.

To calculate the temperature distribution, the authors used the Maple mathematical packages.

The solution to the problem was reduced to finding such a combination of materials for the package, which would realize a minimum of heat flux from its surface while limiting the volume of the package. Thus, we can conclude that using the

proposed mathematical model, it is possible to optimize the choice of materials for the manufacture of a heat-protective suit.

Consider the temperature distribution problem $T_i i$ - th layer in the details of the suit, which is a cylindrical multilayer surface. The ambient temperature is kept constant, equal to T_0 ... The heat flux of density comes from the body to the inner surface of the garment q ... On the outer surface of clothing, heat exchange with the environment occurs according to Newton's law with a heat transfer coefficient α.

Let us introduce the following notation for the basic criteria:

t - time; $T_i(r,t)$ - temperature i -th layer; λ_i - coefficient of thermal conductivity i -th layer; α_i - coefficient of thermal diffusivity i -th layer; R_{i-1}, R_i - inner and outer radii i -th layer; $i = 1,2...n$.

Now consider n - layered hollow cylinder and boundary value problem

$$\frac{\partial T_i}{\partial t} = a_i \frac{1}{r}\frac{\partial}{\partial r}\left(r\frac{\partial T_i}{\partial r}\right), \quad R_{i-1} < r < R_i \quad i = 1,2...n. \quad (1)$$

With boundary conditions:

$$\lambda_1 \frac{\partial T_1}{\partial r}(R_0,t) + q = 0;$$

$$\lambda_n \frac{\partial T_n}{\partial r}(R_n,t) + \alpha\left(T_n(R_n,t) - T_0\right) = 0 \quad ; (2)$$

Ideal contact is assumed between the layers:

$$T_{i-1}(R_{i-1},t) = T_i(R_{i-1},t);$$

$$\lambda_{i-1}\frac{\partial T_{i-1}}{\partial r}(R_{i-1},t) = \lambda_i \frac{\partial T_i}{\partial r}(R_{i-1},t), \quad i = 2,..,n. \quad (3)$$

Initial conditions

$$T_i(r,0) = \phi_i(r), i = 1,..,n. \quad (4)$$

Solving the problem, it is possible to find the temperature distribution in the layers of the suit and, in particular, the change in the temperature of the underwear space depending on time.

The passage of heat through a multilayer spherical wall is described by a system of heat conduction equations:

$$\frac{\partial T_i(r_i,t)}{\partial t} = a_i \frac{1}{r_i}\frac{\partial^2 (r_i T_i(r_i,t))}{\partial r_i^2}, \quad (5)$$

$R_{i-1} \le r_i \le R_i$, Where R_{i-1}, R_i - inner and outer radii i - th layer,

t - time, a_i - thermal diffusivity i - th layer, $(i = 1,..,n)$.

The heat flux of density arrives on the inner surface of the ball segment from the foot q:

$$\lambda_1 \frac{\partial T_1}{\partial r_1}(R_0,t) + q = 0. \quad (6)$$

On the outer surface of the body, heat exchange with the environment occurs according to Newton's law with the heat transfer coefficient α :

$$\lambda_n \frac{\partial T_n}{\partial r_n}(R_n,t) + \alpha\left(T_n(R_n,t) - T_c\right) = 0. \quad (7)$$

We will assume that there is an ideal contact between the layers, which is expressed by the following relations:

$$T_{i-1}(R_{i-1},t) = T_i(R_{i-1},t),$$
$$\lambda_{i-1}\frac{\partial T_{i-1}}{\partial r_{i-1}}(R_{i-1},t) = \lambda_i \frac{\partial T_i}{\partial r_i}(R_{i-1},t), \quad (8)$$

$i = 2,..,n$. At the initial moment of time, the temperature of the telp is set

$$T_i(r_i,0) = \phi_i(r_i), \quad (9)$$

$$i = 1,..,n ...$$

Thus, the process of heat passage through the spherical segment from the body to the outer surface is described by the boundary value problem with the initial conditions given above.

When calculating, we took into account the following criteria:

- the thickness of the layers of materials in the package;
- coefficient of thermal conductivity and thermal diffusivity of package materials;
- the density of the heat flow coming from the body;
- ambient temperature;
- initial temperature of the package of materials;
- coefficient of heat transfer from the outer surface of the package to the environment;
- the presence of an additional layer in the form of thermal underwear and a woolen sweater.

When calculating, it was also taken into account that a person has guaranteed thermal protection of the legs, arms and head, that is, he is dressed in accordance with climatic conditions.

The calculation results are presented in Figure 1 for imported materials and in Figure 2 for domestically produced materials. These figures show the dependence of the weighted average temperature of the skin of the human body on the time spent at low

temperatures (-20 ° C; -30 ° C; -40 ° C). It can be seen from the above figures that at the initial weighted average skin temperature of + 36 ° C for all packages of materials, a sharp drop in body temperature is observed at an air temperature of -20°C, -30°C, -40°C.

Analysis of the research results confirmed the justification of using TKPM as cushioning materials in the manufacture of a suit for servicemen of the Arctic, since with all TKPM, the comfort of a serviceman is provided for 2 hours of his stay in climatic zones with an ambient temperature of -20 ° C and -30 ° C, but comfortable conditions when it is in the climatic zone at -40 ° C is provided only with the use of TKPM AKR-622 / AKR218, the thermal conductivity coefficient of which is the lowest, namely $\lambda = 0.009 W / m \cdot ° C$.

If for shoes and clothes the software developed by the authors allows to formulate requirements for a package of materials and ensure a comfortable state of servicemen for the performance of their official duties, then for the face, hand, big toe, comfortable conditions are guaranteed without additional research on the selection of packages of materials. fails.

The characteristics of the materials for gloves, the use of which would be justified, is given in table 1.

The analysis of foreign experience has shown that the so-called mitts are used together with gloves.

Mittens - gloves without fingers held on hand with the help of jumpers between the fingers or due to the plastic properties of the material from which they are made. Mitts protect your hands from cold, but do not hinder the movement of the fingers.

Initially, mitts were used to protect against the cold when performing work that required finger mobility. But starting from XVIII century mitts began to be used as a fashionable female accessory, ladies wore mitts indoors, respectively, mitts performed more an aesthetic rather than a practical function. This fashion lasted even in 19th century... Both simple knitted mitts and lace were used, and they could reach in length both to the middle of the arm and to elbow...

In Russia mitts were used in 19th century and were considered women's gloves. At the moment, mitts are used as women and men, but still considered to be more feminine accessory clothes... Women's mitts can be decorated with various patterns...

In some models, the material may slightly cover the fingers, in other models, the material covers only the palm and back of the hand. Mitts can also cover not only the palm, but also part of the hand, rising more or less high.

There are different types of mitts: ordinary mitts without fingers; mitts with a clip-on mitten; "Pipes" without compartments for fingers and palms.

The peculiarities of the choice of materials for gloves for servicemen in the Arctic are provoked by the climatic conditions of this zone in order to guarantee him comfortable conditions during the entire period of use or his military duties. At the same time, special attention was paid to ensuring the comfort not only of the soldier's hand, but especially the index finger of the right, if he is right-handed, and of the left hand, of course, if he is left-handed. This need is dictated by the specifics of the performance by the military personnel of their duties, namely, to carry out shooting, in which a more intensive cooling of the index finger is provoked.

The use of mitts provides the soldier with additional protection for the hand, and what is especially important, for the index finger, while the main protection is provided by the glove, and here the authors test not only different wool, but also yarn, forming it from one or double thread.

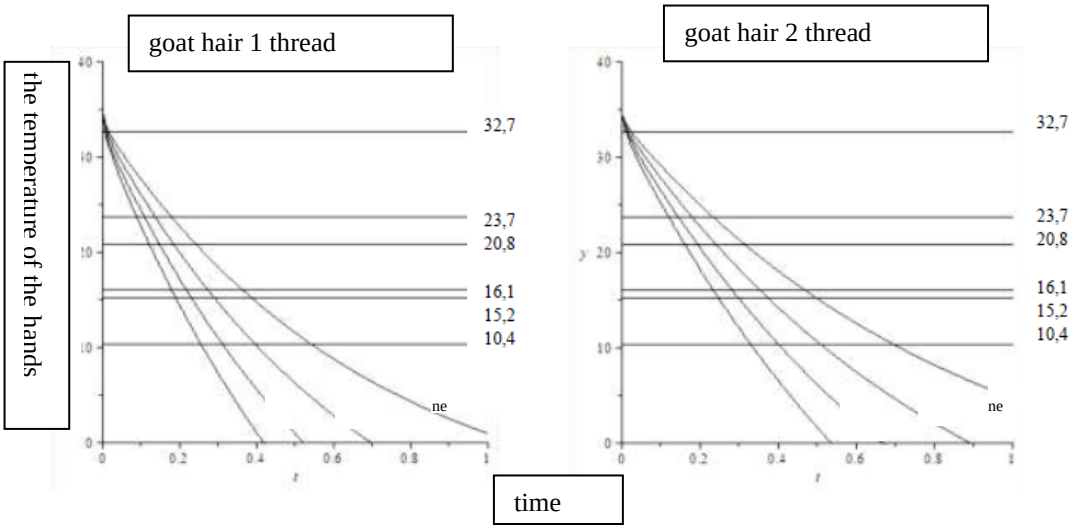
Possibilities of using nanomaterials capable of thermoregulation and providing the skin of the hand with a comfortable temperature, not less than 32 ° C. Such studies are possible using the same software that the authors developed and used for materials, the characteristics of which are given in Table 3.

Table 3 - Characteristics of materials for the manufacture of gloves for military personnel in the Arctic

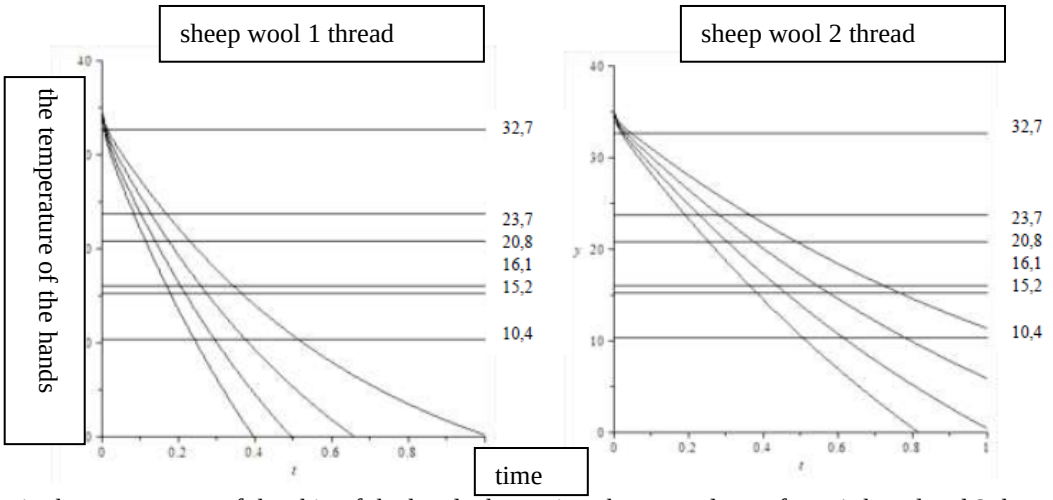
Materials used to make gloves	Thickness mm	Coefficient of thermal conductivity, λ, W / m ° C
1 Single strand yarn:		
1.1 From goat hair	0.7	0.015
1.2 Sheep wool	0.8	0.020
1.3 Camel	0.9	0.005
1.4 From dog hair	0.8	0.010
2. Two-strand yarn:		
2.1 From goat hair	1.4	0.015
2.2 From sheep wool	1.6	0.020
2.3 From camel	1.8	0.005
2.4 From dog hair	1.6	0.010
3. A package of materials for the index finger of the hand, suede + yarn from one strand		
3.1 when using goat hair	1.7	0.02 / 0.015

3.2 when using sheep's wool	1.8	0.02 / 0.020
3.3 when using camel hair	1.9	0.02 / 0.005
3.4 when using dog hair	1.8	0.02 / 0.010
4. A package of materials for the index finger of the hand, suede + yarn from two strands		
4.1 when using goat hair	2.4	0.02 / 0.015
4.2 when using sheep's wool	2.6	0.02 / 0.020
4.3 when using camel hair	2.8	0.02 / 0.005
4.4 when using dog hair	2.6	0.02 / 0.010
5 Material for the fingertip of the index finger of the soldier's hand - "natural suede leather" and for mitts	0.8	0.020

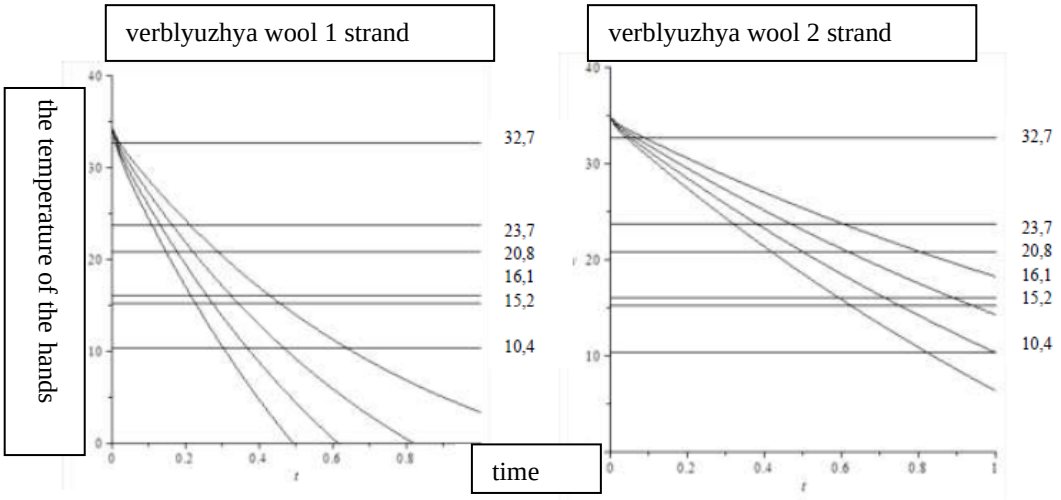
With the help of the software developed by the authors, graphs were constructed characterizing the condition of the skin of a soldier's hand for four ambient temperatures, namely: - 100C, -200C, -300C, -400C from the time he spent at the post, but not less than 1 hour. The figures show the temperature values of the skin of the hand, characterizing the various heat sensations of a serviceman, namely, comfort 32.7 ° C, slightly cool 23.7 ° C, cool 20.8 ° C, cold 16.1 ° C, very cold 15.2 ° C, pain 10.4 ° C (frostbite). At -10 ° C, a comfortable state is provided only by a suede-dog hair package (double thread), and for -20 ° C, -30 ° C, - 40 ° C, none of the materials under study and their packages together with natural fur "winter" do not guarantee comfortable conditions for servicemen.



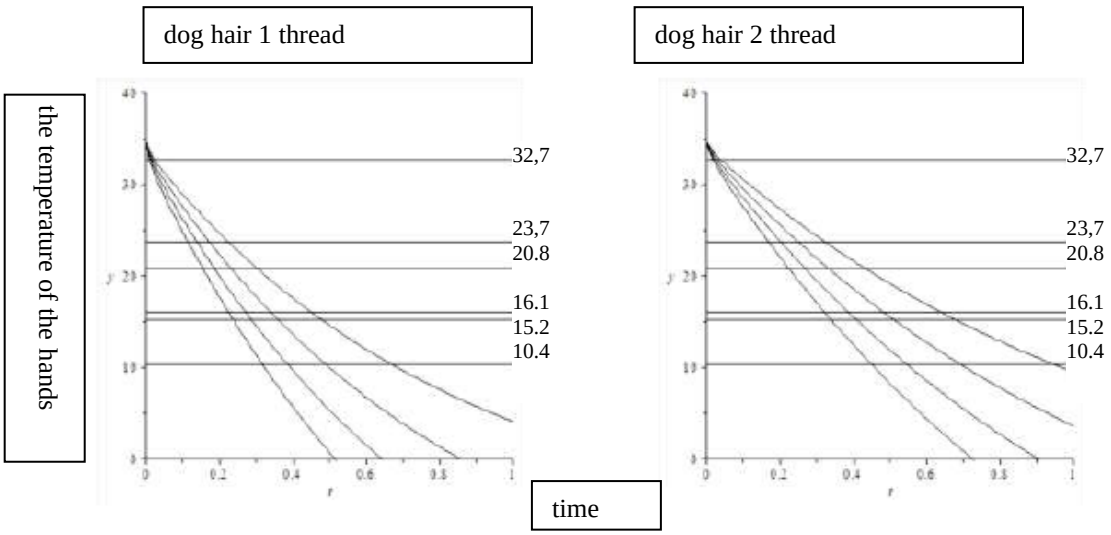
a) Change in the temperature of the skin of the hand when using goat hair yarn from 1 strand and 2 strands for gloves



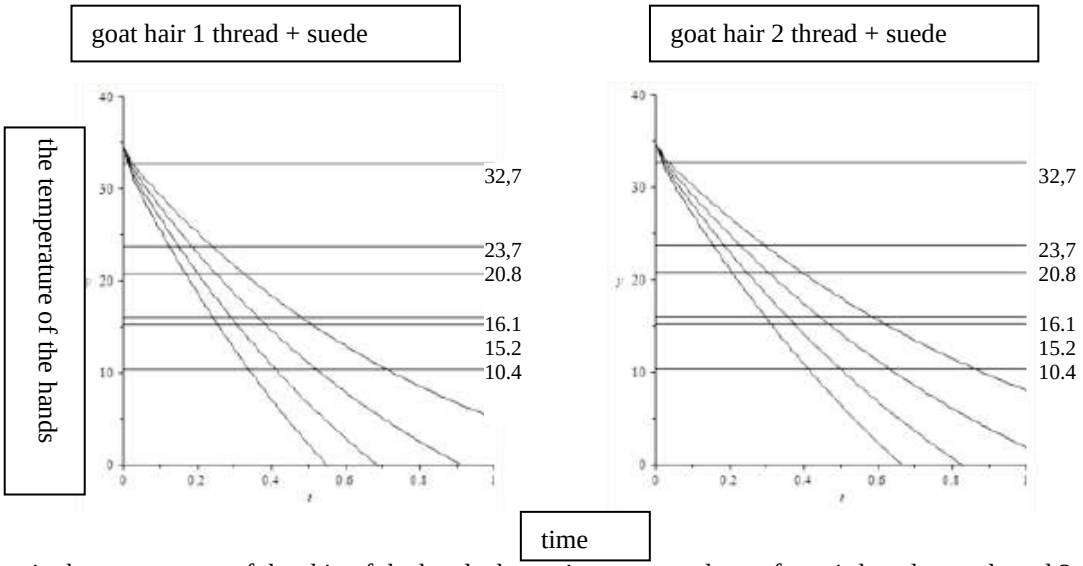
b) Change in the temperature of the skin of the hand when using sheep wool yarn from 1 thread and 2 threads for gloves



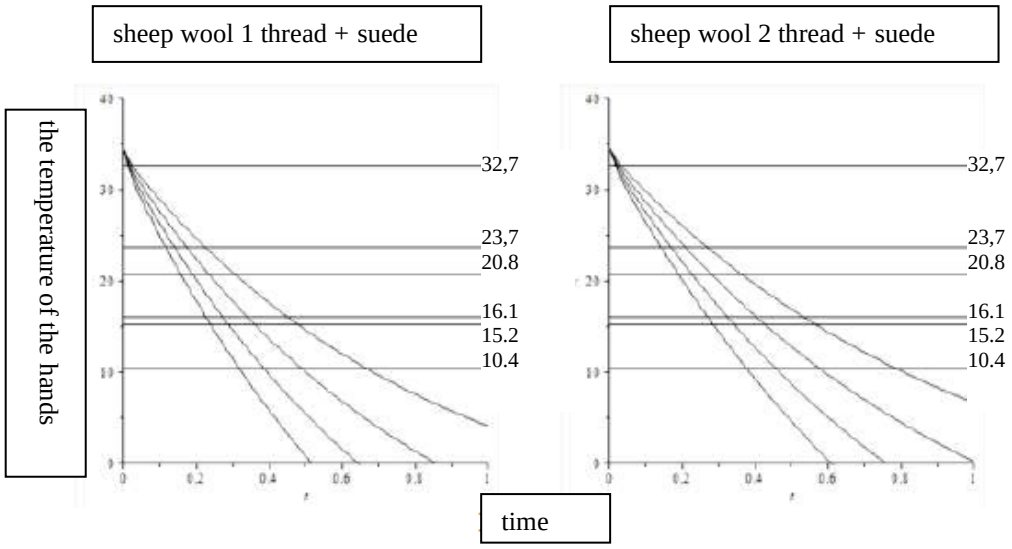
c) Change in the temperature of the skin of the hand when using camel wool yarn from 1 thread and 2 threads for gloves



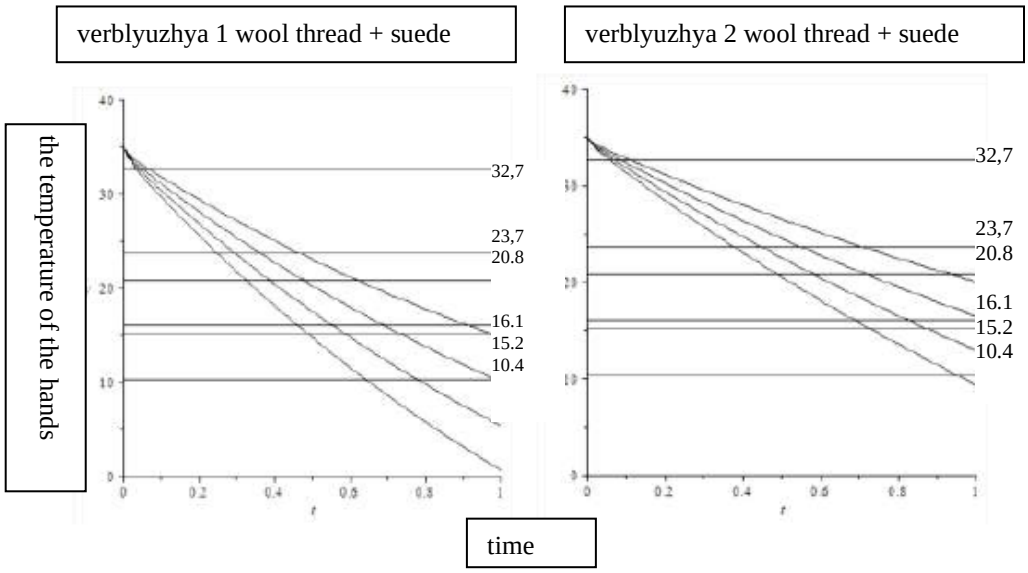
d) Change in the temperature of the skin of the hand when using dog wool yarn from 1 strand and 2 strands for gloves



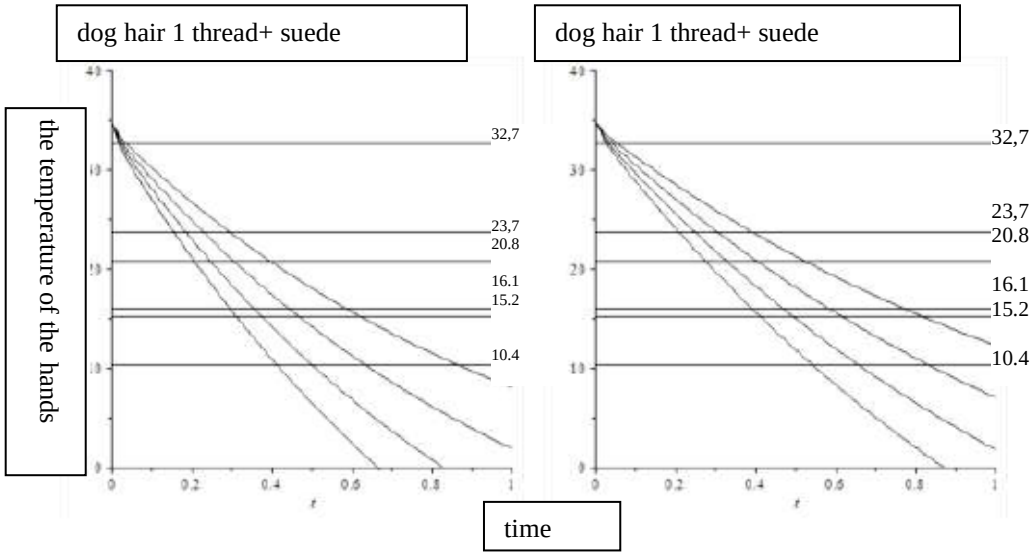
e) Change in the temperature of the skin of the hand when using goat wool yarn from 1 thread + suede and 2 threads + suede for gloves



f) Change in the temperature of the skin of the hand when using sheep wool yarn from 1 thread + suede and 2 threads + suede for gloves

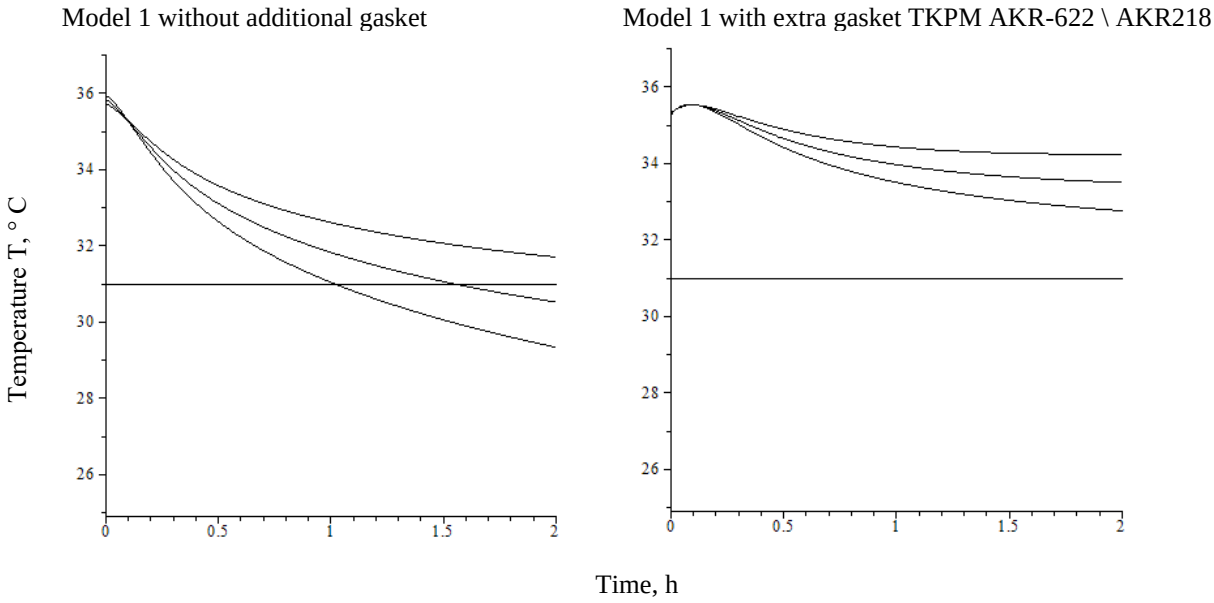


g) Change in the temperature of the skin of the hand when using camel wool yarn from 1 thread + suede and 2 threads + suede for gloves



e) Change in the temperature of the skin of the hand when using dog wool yarn from 1 thread + suede and 2 threads + suede for gloves

Figure 1 - Characteristics of the state of comfort of the hand (skin) of a serviceman when he is in various climatic conditions: curve 1 - at -10 ° C, curve 2 - at -20 ° C, curve 3 - at -30 ° C, curve 4 - at -40 ° C



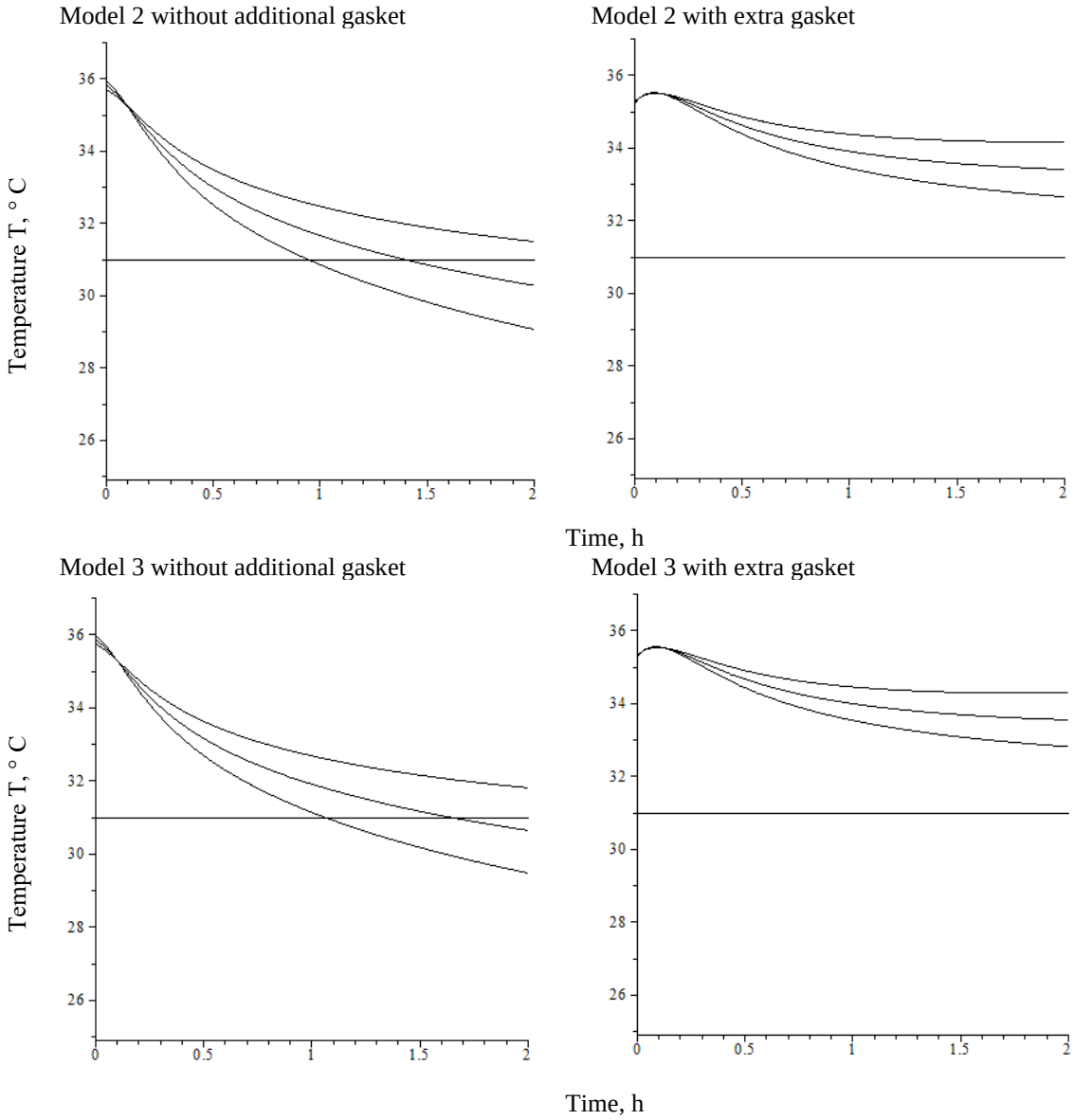


Figure 2 - The results of calculations of the weighted average temperature of the skin for bags consisting of imported materials at ambient temperatures: curve 1 -20 ° C, curve 2 - 30 ° C, curve 3 - 40 ° C.

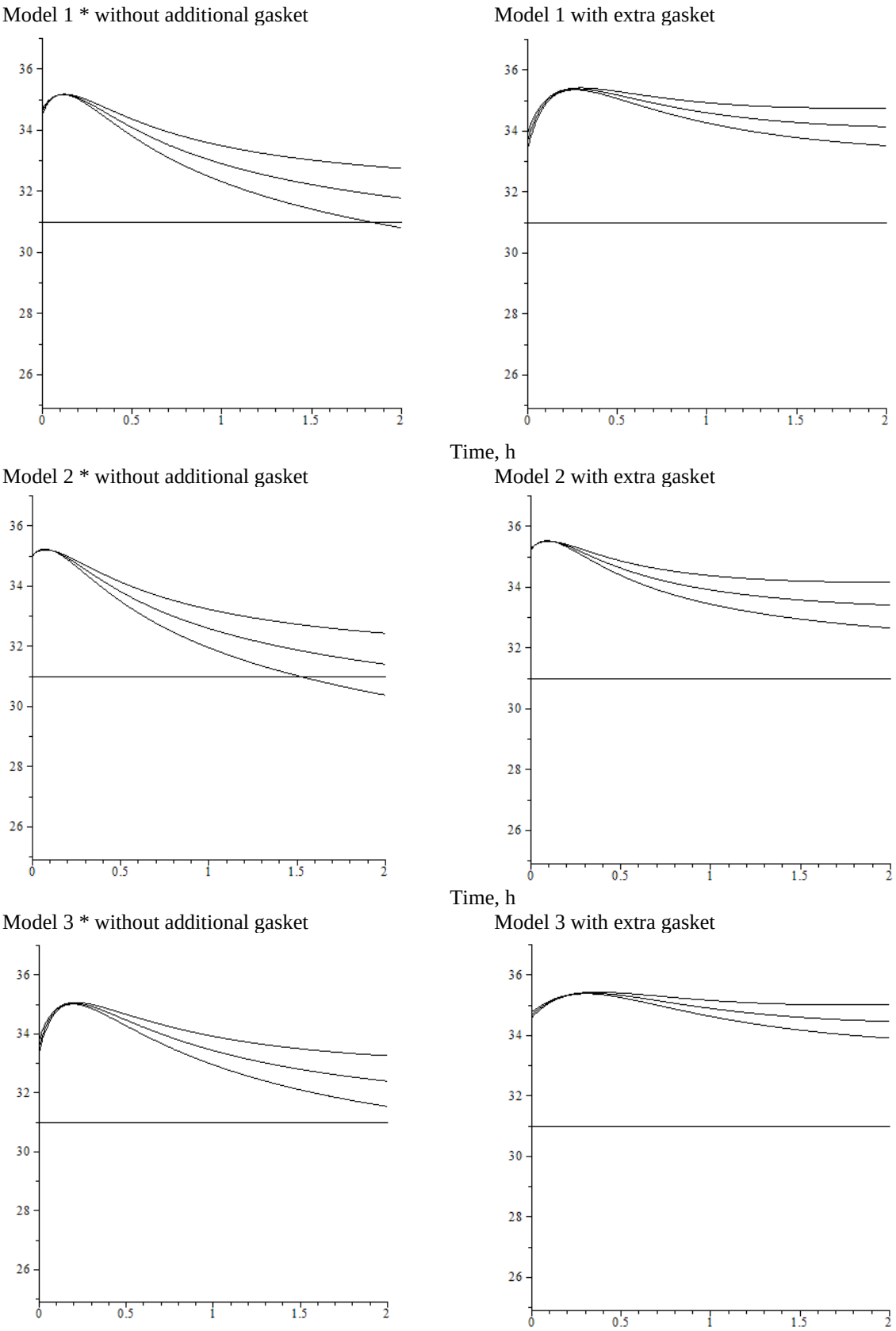


Figure 3 - The results of calculating the weighted average skin temperature for bags consisting of domestically produced materials at ambient temperatures: curve 1 -20 ° C, curve 2 - 30 ° C, curve 3 - 40 ° C.

Conclusion

Has been proven that the main criterion for the comfort of a suit of servicemen in the Arctic when they are in different climatic zones is the coefficient of thermal conductivity;

The possibility of using the software product to substantiate the choice of material packages for the suit of the Arctic military personnel in various climatic zones was confirmed;

High coincidence of the calculated values of heat loss from the surface of the tested jackets with experimental data was achieved, which confirms the legitimacy of using the software product developed by the authors for a reasonable choice of material packages for a suit of Arctic military personnel located in different climatic zones;

It has been proven that the use of domestic nanomaterials and nanotechnology as linings for suits for servicemen in the Arctic during the period of the need for import substitution due to sanctions has confirmed their high quality and efficiency, which allows expanding research and their production with the presence of basic criteria that form a comfortable state in within two hours in any climatic zone.

Consequently, the results obtained substantiated the high efficiency of using the software for a reasonable selection of packages of materials for gloves and other sets of suits for Arctic servicemen and confirmed the need to continue research on the selection of such materials that would provide them with a comfortable state in a given temperature regime for at least one hour.

For the packages and materials shown in Table 3, curves are plotted characterizing the state of comfort of the soldier's hand for the following ambient temperatures, namely, curve 1 at -10 ° C, curve 2 at -20 ° C, curve 3 at -30 ° C, curve 4 - at -40 ° C (Figure 3).

The software developed by the authors allows the manufacturer to have a tool for making an informed decision on the choice of material packages for the suit of the Arctic military personnel, including in the production of gloves to protect the hand from the effects of low temperatures while performing their statutory duties.

Confirmation of these conclusions is the analysis of the properties of the most effective in terms of comfortable conditions of the skin of the hand, carried out by the authors, providing a constant temperature within 32.5 ° C.

Unfortunately, gloves made from wool yarns of various animals, made from either one or two threads, do not guarantee servicemen such a comfortable state even at a temperature of -10 ° C, not to mention that the air temperature may be lower. In this case, the skin surface of the hand is cooled below the critical value, i.e. below 10.4 ° C and can lead to frostbite and irreversible processes.

The use of mitts to protect the hand also does not guarantee the servicemen protection from the effects of low temperatures, suggesting the search for such materials and the formation of bags from them for the manufacture of gloves that would provide them with comfortable conditions, which is possible when using nanomaterials capable of thermal regulation within the limits, allowing servicemen to fulfill their statutory duties within the required time period.

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INNOVATIVE TECHNOLOGIES IN THE DIGITAL ECONOMY

Abstract: *This article examines the information market, which is characterized as a pool of social, legal and economic relations that develop in the sale and exchange of information products between consumers, manufacturers and intermediaries, as well as methodological approaches to managing technological change are focused mainly on a clear link to industries.*

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Introduction

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The rapid development of digital technologies leads to radical transformations not only in the economy, but also in society itself. So, due to the reduction of information costs, digital technologies significantly reduce the cost of economic and social transactions for the state, companies and individuals, promote innovation, in which transaction costs become practically zero, and also dramatically increase efficiency: existing activities and services become cheaper, faster or convenient. And finally, digital technologies facilitate integration: people get the opportunity to use services that were previously unavailable to them [1].

In parallel, the information market is being formed, which is characterized as a pool of social, legal and economic relations developing in the field of sale and purchase and exchange of information products between consumers, producers and intermediaries. This approach enhances the dominance of the information industry in the economy of a number of countries, the sphere of production and services is becoming more and more knowledge-intensive and innovative [2].

Over the past decade, the above processes not only led to fundamental changes in business models and the nature of consumer behavior in the modern economy, but also created the basis for the transformation of a wide range of social processes, including high-tech production [3], economic activity, financial services, educational concepts and standards, areas of entertainment and leisure. This infrastructure, based on electronic interaction, is becoming a new vector in the development of the global economy, which acquires the status of digital as an economic activity based on digital technologies [4].

The past decade has seen a rapid development in digital technology. The population with access to the Internet increased between 2005 and 2016. from 1 to 3.4 billion people, covering more than 40% of the total population of the planet [5]. The number of households in developing countries with a mobile phone is higher than that with access to electricity or clean drinking water. Almost 70% of those in the lower quintile of the population own mobile phones, while in high-income countries this figure is 98% [1].

Existing methodological approaches to managing technological changes are focused mainly on a clear link to industries, large industrial companies that search for and implement new technological solutions in the field of production, new materials to achieve local (niche) competitiveness through their own sources of funding or borrowed funds ... At the same time, mechanisms for interaction with the state (regional) level on the management of technological change processes arise only if companies are included in the state (departmental) development program and

receive funding opportunities from the budget. In all other cases, the strategies (programs) of socio-economic development at the regional level take into account technological changes indirectly, based on the existing trends in the development of industries through the growth of labor productivity and investment in fixed assets, without a clear idea of the intentions of industrial companies to change production technologies, transfer on the sixth technological order, competitive positioning of business in the global and national commodity markets.

However, the deepening contradictions between the processes of global competition and regional economic integration, going beyond the management of the competitiveness of individual local industrial industries, involving all participants in the full life cycle of products (LCP), necessitate a deeper study of the management of technological changes in business, especially for the territories of resource regions. ... In these conditions, the regional management system should be aimed at optimizing the development ratio of the existing basic sectors of specialization of raw material regions (resource and raw materials, infrastructure) and the formation of new sectors of the innovation and economic system that can not only withstand the global challenges of the world economy, but also ensure sustainable economic growth. on the basis of a change in the system of rights and responsibility between government entities and business entities for the technological development of the region, the transition to technologies of the sixth technological order. The study of world scientific, technological, economic and social trends allows us to distinguish two types of global challenges that cause the objective need to change the management formats of the regional authorities of resource regions and the mechanisms of interaction with business.

The transition to digital economy technologies is significantly determined by the innovative and technological activity of enterprises (organizations) that claim in their activities to change the strategic, market repositioning on world, national, regional commodity markets (introduction of goods into new sales markets; into new groups-consumer segments; introduction of goods to new geographic markets). The costs of technological, marketing, organizational innovations in the Krasnoyarsk Territory amount to more than 60 billion rubles, which are engaged in by 85 organizations. At the same time, almost 99% falls on the cost of technological innovation 60.1 billion rubles. incl. product innovations - 49.9% (29.9 billion rubles), process innovations - 50.1% (30.1 million rubles). At the same time, the costs of technological, marketing, organizational innovations in the mining sector account for only 0.9% (547.1 million rubles). incl. 99% - the cost of technological innovation (543.9 billion rubles) (table 3.1.1). Considering that large companies represent the resource-mining sector in the Krasnoyarsk Territory, the costs of technological innovations are mainly carried out at their own expense - 50.4% (30.3 billion rubles) and at the expense of the federal budget - 41.4% (24.9 billion rubles). The funds of the region are used insignificantly. Of particular importance is the activity of enterprises in the field of marketing innovations, which allow activating the processes of international and national market repositioning in product markets.

The introduction of technological data is aimed at the regional economy will provide a wide sectoral coverage (basic infrastructure industries; resource and raw materials industries; high-tech industries) and maximum synergistic effects of development, such as reducing the level of negative impact of economic activities (production and consumption waste; emissions of pollutants into the atmosphere air; discharges into water systems) on the natural environment and public health; biodiversity conservation; the formation of new markets (services for biological treatment, water recycling, environmental and safe waste management, secondary raw materials and finished products based on waste and waste processing); ensuring energy efficiency; transition to new technological structures; preservation of the environment and ensuring the safety of life [6].

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According to the results of research work of the past 2020 and published scientific articles in the journal «Theoretical & Applied Science», Presidium of International Academy of Theoretical & Applied Sciences has decided to award the following scientists - rank Corresponding member and Academician of International Academy, as well as give diplomas and certificates of member of International Academy.

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1	**Kulmuratov Nurillo Rakhimovich**	associate professor at the Department of Mechanical Engineering at the Navoi State Mining Institute	assistant professor

Presidium of International Academy
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1	**Kurpayanidi Konstantin Ivanovich**	Corresponding Member of the Russian Academy of Natural Sciences, Russia Fergana polytechnic institute, Fergana, Uzbekistan	PhD in economics, professor

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