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ABOUT IMPROVEMENT OF THE UNION OF THE ORTHOPEDIST AND PRODUCERS OF CORRECTIVE MEANS FOR REDUCTION OF PATHOLOGICAL DEVIATIONS OF FEET AT CHILDREN (MESSAGE 3)

Abstract: *in the article, the authors have developed recommendations for the orthopedist and manufacturers of orthopedic shoes on its correct selection, taking into account pathological abnormalities, to ensure the formation of a healthy foot for the child, excluding the formation of pathological abnormalities. At the same time, the authors substantiate their concern about the reduction of social protection of families in Russia, whose children have pathological abnormalities, to provide them with free service from an orthopedic doctor in regional centers with mandatory payment by social bodies of municipal, regional and Federal branches of government of the costs of manufacturing medical, preventive shoes and corrective products that create comfortable conditions for the child's foot.*

Key words: *valgus, varus, clubfoot, hard side, pronator, oblique, cork, arch layout, beveled heel, lacing, hard heel, hard toe, special soft, hard and metal corrective parts, range of shoes, pathological abnormalities, anthropometry, demand, implementation, competitiveness, demand, financial stability, plantography, rengenography, plaster casts, prosthetics, rehabilitation.*

Language: *English*

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Introduction

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the beginning (the first part)

Solve the problem of preserving and strengthening health can not only using the medicine are important external environment and way of life. It should be understood that the way of life - it is not only the presence or absence of bad habits. Lifestyle is a social category and includes welfare, culture, education, medicine, as well as the quality of

consumed products. So, for products that can affect children's health concerns and shoes. A significant prevalence of foot deformities of children, such as flat feet, makes the problem of mass production of shoes with preventive properties. Shoes with prophylactic properties of a certain segment of the consumer market of Child and Adolescent shoes. It is distinguished by the presence of design solutions, providing its maximum comfort in wear, the presence of special parts (ins anatomical insoles, polustelki, calculations), a rational evidence-based internal form

of footwear and application of high-tech materials in the manufacture of shoes, their rigorous selection of physical - mechanical and hygienic parameters. On preventive footwear experimenting with new designs and materials to ensure maximum comfort for imposed the, and the creation of necessary conditions for the prevention of disease and foot deformities.

What are prophylactic and orthopedic children's shoes?

First of all, what is called the orthopedic shoes:Orthopedic footwear, according to GOST R 57761-2017 - a shoe, the design of which was developed taking into account abnormalities in the foot, lower leg or thigh. Based on this definition, think for yourself: Do I need "orthopedic" shoes a healthy baby? Should the right children's shoes to be an orthopedic? In our understanding, no. But in this matter, such confusion is created, often in orthopedic salons and pharmacies sell the right children's shoes, which is called orthopedic. And in fact it ispreventive shoes, or shoes made just for everyday wear in accordance with GOST 26165-2003. Prophylactic - a shoe, the design of which was developed in view of preventing the formation of pathological abnormalities in the child's foot.

This definition gives just the most famous Albrecht Institute in Saint - Petersburg. Thus, the "orthopedic" shoes for kids today is divided according to GOST R 57761-2017 on prevention and therapeutic children's shoes.

Preventive shoes - this is the right baby shoes recommended for healthy children who stop looks like she put on age. Consider its features.

What materials should be manufactured children's shoes?Made of soft, natural, ventilated. Natural materials and should be the top, and the "insides" of the shoe to the foot of the child did not sweat and there were no irritations baby delicate skin of the foot.

More precise characterization of materials Preventive shoes.

What should be the sole? She must be:

1. Flexible so as not to disturb the operation of the foot and lower leg muscles. Moreover, the sole should bend not anywhere, that is, in place of the joints where the shank goes into fingers.

2. Not moving to reduce the risk of falls.

3. With a roll in front of, that is, its toe should be slightly raised above the ground. It is necessary to correct gait (Figure 1) formed in the child.

Fig. 1 - Appearance of Preventive children's shoes

What should be the toe of the right children's shoes?

It should be broad. No narrowed socks in children's shoes should not be, fingers to the foot of the child to feel free.

Should there be a heel?

Yes, a little heel should be 5-10 mm. Firstly, it prevents the child fall back, that often happens in children. Second, it increases the load on the muscles of the foot and helps her workout muscular system.

Heel shape must be such as shown in Figure 2:

Figure 2. Heel shape for preventive children's shoes

This is Thomas heel, he lengthened on the inside to keep the middle part of the foot and prevent blockage inside it.

What should be the backdrop?

It should be closed and rigid, to the child's heel is properly locked and will not overwhelm (Figure 1).

What should be the clasp?

They need to be regulated, it is good to fix the leg of the child.

The preferred Velcro fastener shown in Figure 3.

Figure 3 - view of the children's prophylactic footwear with Velcro clasps

Do I need arch support in children's shoes?

Instep - a small rise on the inner side of the insole, which is located under the longitudinal arch of the foot and "supiniruet," that is deploying the foot outward (Figure 4).

Figure 4 - Corrective detail - the instep for prophylactic and orthopedic children's shoes

With regard to this element the most disagreement among doctors - orthopedic surgeons, the prevailing view that it is not needed in preventive shoe. Why?

- At first,it must be positioned precisely at a certain place of the foot. But often buy baby shoes "for growth", and the instep is not where it should be. This can only harm a developing child's foot.

- Secondly,by maintaining the place where it should form a set, how it can be generated? In our opinion, the instep only hinders training of their own child's foot muscles.

In addition, the insoles are different: small, soft, or, on the contrary, hard, high. The latter must be made individually for a specific stop. Low soft insoles are recommended only in the sports children's shoes. At high physical activity is important to support the longitudinal arch. But if sports shoes is not used for its intended purpose, and to "force" in it, the arch support is not needed. Shoes with arch support properly be called "preventive and curative" and, in our opinion, it should recommend a doctor - orthopedist at the initial stages of a child's flat feet.

Thus, the signs of the right children's shoes, designed for a healthy baby are:

1. Natural materials.

2. Flexible, non-slip, with a roll sole.

3. Wide toe part.

4. 5-10 mm heel

5. Hard backdrop.

6. Adjustable buckles.

7. Lack of arch support. At least in the pre-school shoes.

But the correct conclusion that the forced correction arches of the foot in children 6-7 years old violates the process of formation of the child's foot,and if the child has signs of mild flat foot, the doctor - prescribe orthopedic shoe insole in prevention with the laying out of the longitudinal arch. This will be the best solution.

Figure 5 - The appearance of the summer children's orthopedic (medical) Shoe

Therapeutic shoes for children, which can be seen in orthopedic salons and pharmacies, and is divided into antivarusnuyu antivalgusnuyu. Some producers still allocate a stabilizing shoe that is applied with a slight varus, and with a slight valgus. This shoe puts the foot in the correct position and stabilize it (Figure 5).

As you can guess, antivarusnaya shoes used in varus foot deformity, that is when the child goes to the outer arches - "Clumsy" and antivalgusnaya - when he walks on the interior arches, ie, when the foot "fall down" inside. Moreover, these deviations are beyond the physiological characteristics of the child's foot. Antivarusnaya stop looking as if the left leg confused right. In more complex cases, orthopedic shoes are produced individually for a particular child, taking into account the pathological changes of his foot.

Therapeutic shoes is done on a special orthopedic shoe -GOST P 53800-2010. Shoe last - a wooden or plastic molding for manufacturing of shoes, designed to meet the specific pathology. For various pathology uses its own block. These shoes, as opposed to preventive, higher, to be fixed in the correct position, not only to stop, but the ankle. Along with the tough backdrop, it has a tough ankle boots, that is the hard side panels, which have a certain length. Therapeutic footwear heel has Thomas: antivalgusnaya shoes with an elongated inner edge, antivarusnaya - with an elongated outer edge (Figure 6).

There should be no arch support in medical footwear. If necessary, the doctor - orthopedist appoint a lord taking into account the particular pathology of the foot may be an individual.
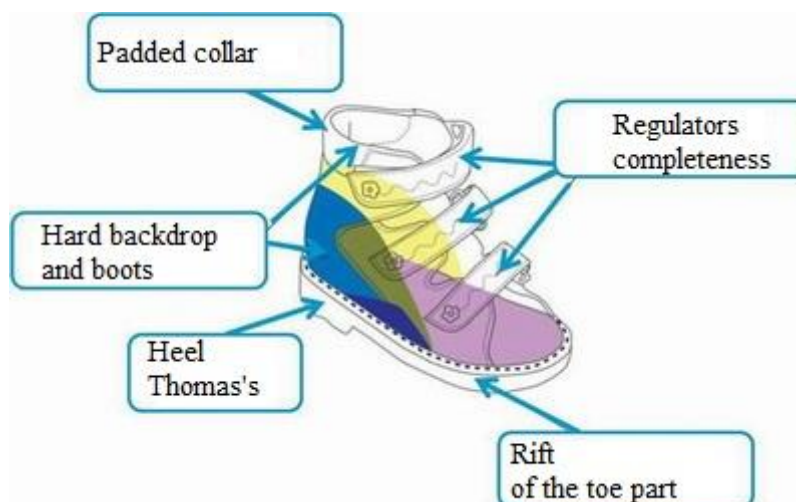

Figure 6 - DATA Specific children's orthopedic shoes

Dear adults, remember that foot baby - very "grateful" materials for correction. It is soft and pliable. The main thing is not to miss. Foot pathology in children can be corrected up to 10 years of age. So stop you - the parents - to hang around at the computer, and pay more attention to their child.

Characteristics of rational design of the
following preventive footwear

Increased comfort requirements infant shoes are preventive plurality anthropometric, hygienic and psychophysiological properties, resulting in, provided that the normal functioning of the foot. Using shoes, not satisfying the requirements of hygiene, as well as having even a slight deviation in a ratio of shape and dimensions vnutriobuvnogo space with the shape and dimensions of the foot may lead to deviations from the normal anatomic structure and functioning of the foot, and as a consequence, adversely affect the overall health child.

Currently, there is a significant prevalence of foot deformities and diseases of children. The occurrence of these distortions, the most frequent initial degree of flatfoot, and increased sweating, footwear plays an important role.

Comfortable shoe to be determined by its ability to maintain vnutriobuvnom space required humidity and temperature, which in turn depend on the selected materials for the manufacture of shoes and its structure. Moisture is marked with a foot surface, it is removed from the space vnutriobuvnogo resulting moisture exchange processes due to sorption capacity and vapor permeable materials and so-called ventilation effect when moisture is removed from the space between the foot and footwear.

In the closed ventilation shoe as a result of the effect of a slight amount of moisture is removed. At the same time a closed shoe uppers are widely used artificial leather (IR), rubber and PVC with low water vapor permeability and hygroscopicity. In such shoes vnutriobuvnom space accumulates a large amount of moisture, which causes discomfort, and the appearance of skin diseases. When used for a closed shoe upper materials tight removal of moisture from the foot occurs mainly by absorption of internal components - liner and the supplementary insole. Thus most of the moisture is concentrated in the main and supplementary insole, so the material of these parts must be moisture capacity. Insole materials are characterized by high density, high strength after soaking in water and low friction in wet condition. In addition, insole materials should be flexible, porous and vapor - permeable and, have low thermal conductivity to prevent overheating of the foot in the heat and cooling without resizing a change of moisture content does not buckle upon moistening and drying, have elasticity. Removable insoles improves the thermal insulation properties shoe bottom, cushioning capacity increases, lengthening the period of wear and facilitating walking. Removable insoles should be flexible, soft, resilient, have a low density.

The company Omnipel (Italy) created the Micro-Air material for loose insoles. This flexible composite material based on polyurethane having an open cell structure, air-permeable and water vapor. Thanks to the created pump effect while walking, it creates a pleasant climate in the space vnutriobuvnom. Its advantages can also be attributed good cushioning properties, the possibility of application in all types of shoes, low pressure deformation at multiple static and dynamic loads. Micro-Air can be laminated and, if necessary, treated with fungicides and activated carbon.

The company has developed a composition Emsold Carbosan for details of the foam. It includes activated carbon having a deodorizing action, ie. K. Absorbs substances secreted by the foot. The resulting foamed part (removable insoles, box stack) have good damping properties, kill bacteria and fungi and has a structure with high hygienic properties. Another promising direction is to manufacture materials for supplementary insoles based on flax fibers. Use of textile fabrics containing synthetic materials in technology because of the unique properties of flax - high strength, water absorption, anti-bacterial, ability to reduce static electricity - create opportunities for making artificial environmentally friendly materials with high complex consumer properties intended for the production of a wide range of children's shoes.

As a material for the manufacture of loose parts prophylactic shoes for different parts of the foot it is widely used silicone, as non-slip feet of supplementary insole. Silicone - elastic material, stop on it like a spring, causing the muscles and tendons of the legs are relaxed, blood circulation improves, walking becomes more comfortable and less tired legs. The skin-contacting side of the insole, as a rule, do antibacterial, absorbing moisture and odors, which also adds to the comfort during prolonged walking. In addition, the antibacterial coating allows the foot is easier to penetrate the shoes. Silicone - a material that is almost never causes allergic reactions and prevents the growth and development of various types of fungi and bacteria. Doctors recommend silicone insoles for prevention and treatment of flatfoot syndrome initial degree of diabetic foot, psoriasis, dermatitis, eczema, rheumatoid arthritis, heel spur, in rehabilitation after injuries, cracks and dry skin of the foot. Recently, during the drying of shoes are widely used silica gels.

Empirically it found that in a domestic environment drying shoes via silica gel is much faster and better (absorbed bolshey amount of moisture per unit time). Regeneration (dehydration) silica gels is 2 times faster, at a lower temperature than the drying zeolites. Silica gel is an amorphous form of silica, artificially produced in the form of solid granules uneven (externally resembling crystals), or a solid flat beads. The porous structure of interconnected voids creates an extensive surface area (up to 800 square meters per gram). The silica gel produced in industrial scale and is simple to use, it is capable of adsorbing a wide range of substances. It is most commonly used for the absorption of water vapor, i.e. it is capable of retaining molecules (eg., water) on its inner surface,

so it is often called "dryer". Pore volume silica often exceed 0.2 ml / g, and the inner surface is greater than 400 square meters / gram. Pore radius range from 1 nanometer to several hundred nanometers. Silica gels are distinguished: in the form of grains (granular or lumpy); grain size (large and small); long (large pore and small pore) in size. According to GOST 3956-76 classify types of silica chetyrohbukvennym designation: 1st letter characterizes the grain size (R - large, F - fine, A - activated, W - leads charge); 2nd letter is always On (silica gel); Third letter of the pore size (K - a coarse, M - fine pore); 4th letter of the shape of the particles (D - granulated, K - lumpy).

Prophylactic properties of children's shoes depend essentially on the brace-supporting component, characterized by the distribution of local overloads on the plantar and dorsum of the foot and thereby provides the physiologically normal operation of the muscles and ligaments of the foot. Spacer - vpornuyu comfortable shoes can be increased by a supplementary anatomically contoured insole. Thus, functional disturbances disappear in a physiologically normal deformation of the foot and improve its Musculoskeletal, Suspension and jogging function.

Ins preventive device can increase the support surface and the contact area of the shoe with the foot, whereby the surface pressure is reduced and, accordingly, reduced leg fatigue while walking, which in turn ensures the quality of the shoe. Removable, prophylactic insole with anatomically the averaged profile for the foot bed, made of hygienic material with antimicrobial treatment can solve problemukomfortnosti shoe. Averaged streamlined profile supplementary preventive insole is an important factor in the creation of comfortable shoes for any purpose without imposed the clinical pathology in the anatomy of the foot. It is in this area and conducted research to develop new designs children's preventive loose insoles. Known construction supplementary insole for children's prophylactic footwear comprising an upper, intermediate and lower layers, the upper layer is made of leather, the intermediate layer of priformovyvayuschegosya in socks foamed thermoplastic material, and a lower frame layer of dense thermoplastic material, the intermediate layer with a recess in the heel portion under the tubercle of the calcaneus in 0,18D section, where a - the length of the foot, and the computation of uniform internal and external arches in part with gelenochnoy naivys s point in calcaneal - cuboid joint sectional 0.36 D. The top layer of the insole in the forefoot portion applied dimensional scale markings and a line color zones defining shoe size matching the length of the foot. In another design supplementary insole, consisting of a soft elastic lower layer, the upper layer of flexible, volumetric fixed spikes in the lower layer and on the surface of the insole groups at small distances from

each other, are intended for reflex-therapeutic massaging the foot of the child.

As a method of collecting information authors used questionnaires and interviews. Processing of survey results performed by methods of mathematical statistics.

When analyzing the number of prophylactic shoes in the wardrobe of the child plays a leading role age. For a clearer display, the results are presented as a percentage. Poll Results vast majority of children aged from 1 to 7 letpokazali that they have in their wardrobe at 1 and 2 pairs of prophylactic footwear also increased the percentage of children who are 4 and a pair of winter leather shoes.

According to the study found that in all age groups, children are mainly two pairs of leather shoes. High enough percentage of the presence of three or more pairs of shoes in the two older groups. The majority of respondents (60%) bought shoes on the market. From this we can conclude that the enterprises engaged in production of leather products, you need to make a shoe that would be completely on demand.

To the question "What is the property of prophylactic footwear in your opinion the most important?" The majority of respondents pay attention to durability and comfort. But the material from which made this shoes and hygienic properties of footwear do not pay enough attention. Children preventive footwear should be substantially free form, bright colors with various ornaments. It must be remembered that in this shoe the child has to be in the main street, so it should be hygroscopic.

Consider the answers to the question: "What are the challenges you face when selecting purchase prophylactic shoes?". As the answers were offered the following options: high price, bad appearance, excessive rigidity, it is inconvenient to put on the leg of the child, are not satisfied with the workmanship is not satisfied with the quality of materials. Parents of children at 3-4 years especially unhappy excessive rigidity of the heel of the shoe. Parents are the first children's age group noted the importance of when buying shoes quality of its manufacturing and ease of dressing on the leg of the child. For children of the third age group of parents pointed to the discrepancy between price and quality children's shoes, on its excessive rigidity and a high price.

Analyzing the data, we can confidently say that the most popular among parents and children enjoy the trademarks of leading Russian companies and Savienok Kotofey, despite the fact that there are local and regional producers of Preventive children's shoes.

Flat feet in children

Flat - foot deformity is to reduce its vaults.
Flat - it's not just a cosmetic defect. It is often accompanied by pain in the feet, legs, fatigue when walking, difficulty in running, jumping, deterioration

of motor coordination, overloading of the joints of the lower extremities, the earlier appearance of pain syndromes osteohrondroza.

Flatfoot causes are: congenital abnormality (11.5% of all congenital defects of the foot), rickets, nervous system disease (paralysis, paresis of lower limbs, general muscular hypotension, and other), trauma stop (fractures of bones of the foot, ankle, wound with nerve damage , tendons, muscles) and inadequate static load. As a rule, there are several reasons for the complex. Most operate such more or less obvious factors as rickets, general muscular hypotonia, inadequate static load. The reason for the latter lies usually not in violation of the motor mode, and wearing shoes irrational child in violation of muscle tone, increased flexibility for bags and ligaments.

types of flatfoot

The following types of flatfoot:
- longitudinal;
- cross;
- combined (longitudinal poperenoe).
  The degree of longitudinal flat

I degree: set angle 131 ° - 140 °, the height of the arch 35-25mm. Deformations of the bones of the foot there.

II degree: set angle 141 ° - 155 °, the height of the arch 24-17mm. Astragalus shortened cervix it is not highlighted. There may be conditions in arthrosis deformans talo-navicular junction or calcification ligamentous apparatus on the dorsum of the foot.

III degree: set angle 156 ° and above, the arch height of less than 17mm. A small protrusion on the plantar surface of the heel bone becomes massive. Is

noted and flattening and transverse arch, finger tapping contracture 1, proniruetsya foot, the heel is deflected outwards

Degree of cross flatfoot

I stepem: angle between 1 and 2 metatarsals 10 ° - 12 °, the angle of deflection fingers 1 15 ° - 20 °.

II degree: angle between 1 and 2 metatarsals 13 ° - 15 °, the angle of deflection fingers 1 21 ° - 30 °.

III degree: angle between 1 and 2 metatarsals 16 ° - 20 °, the angle of deflection fingers 1 31 ° - 40 °.

IV degree: angle between 1 and 2 metatarsals more than 20 °, the deflection angle 1 bolyshe finger 40 °.

diagnosis of flatfoot

Children with flat feet, can express complaints leg fatigue, pain in the feet, legs while running, long walks and by the end of the day. Perhaps the appearance of headaches after the motor load as a consequence of reducing the spring stop function. At the feet of the localized pain, usually in the area of the arch, at the inner edge of the heel, in astragalocalcanean-scaphoid articulation, under the ankles. The legs are localized pain in the calf or the tibialis anterior muscle. The height of the inner and outer arches of the foot is lowered, the foot is elongated and expanded in the middle and front sections. A vague navicular can through the skin on the medial side of the foot. Spanking gait characteristic of dilution of socks in hand, while standing desire to put the foot on the outer edge, uneven wear shoes: faster tread down the inner part (Figure 8 - 11,15,16).

no platypodia

I degree platypodia

II degree platypodia

III degree platypodia
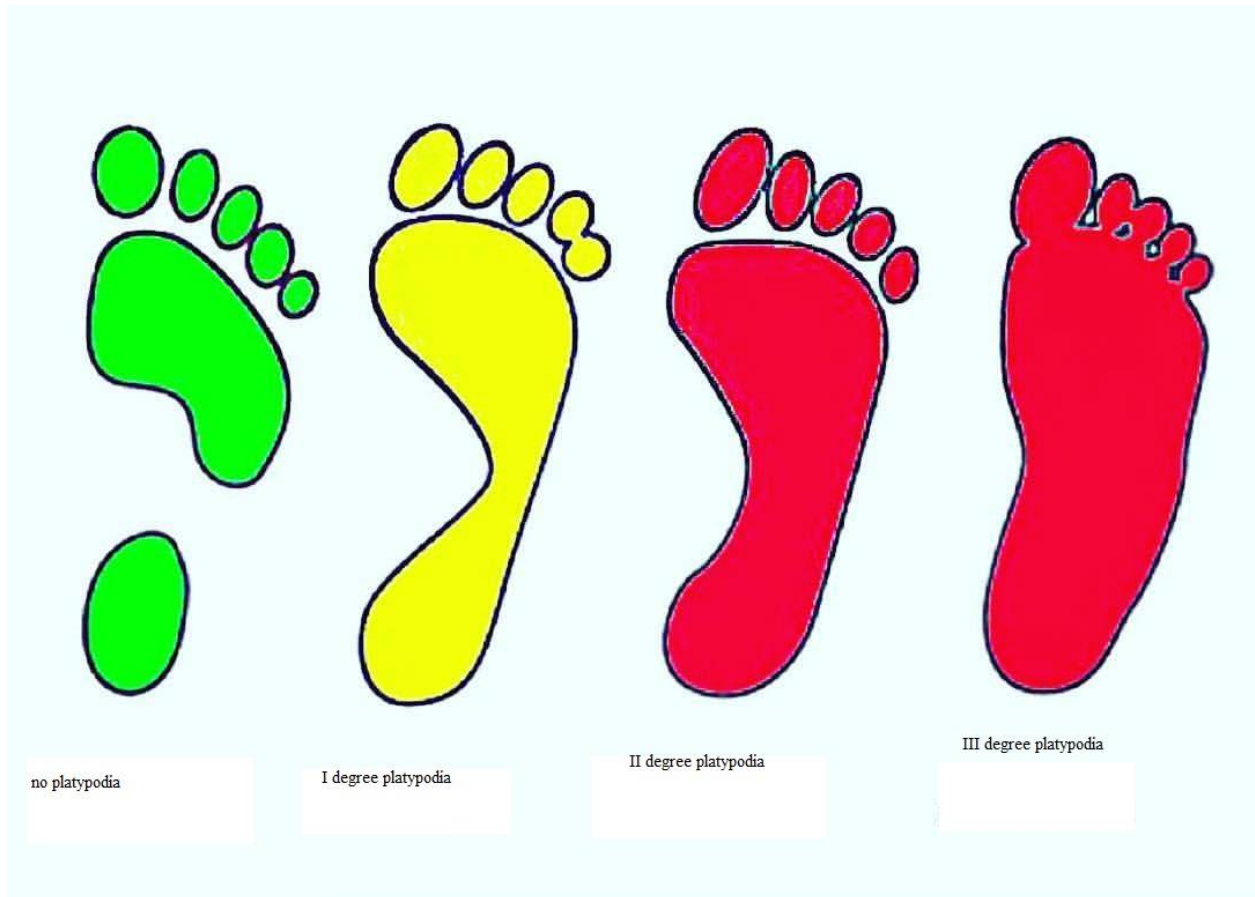
Figure 8-characteristic number of degrees of flat feet
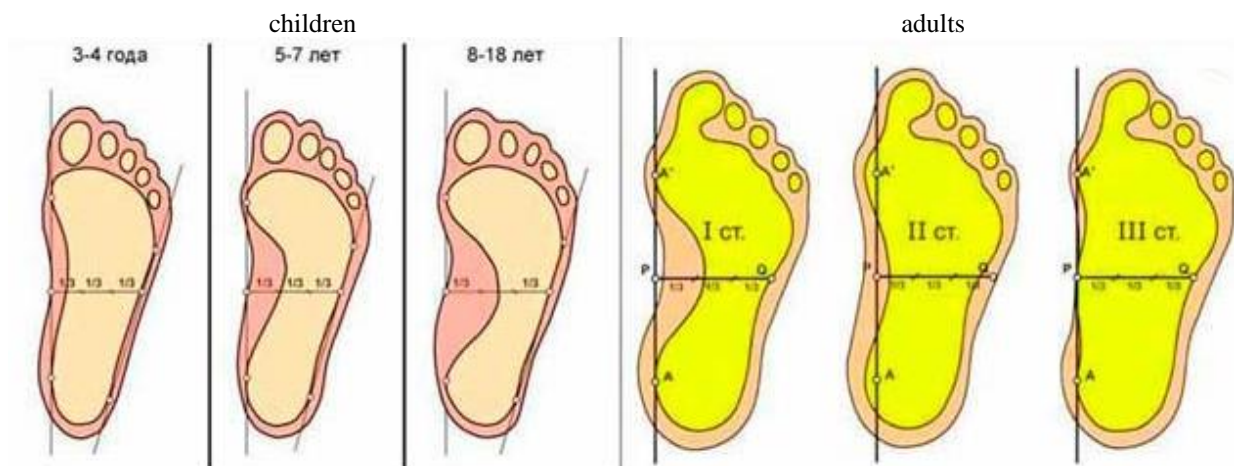
children   adults

Figure 9 - Features flat feet in children and adults
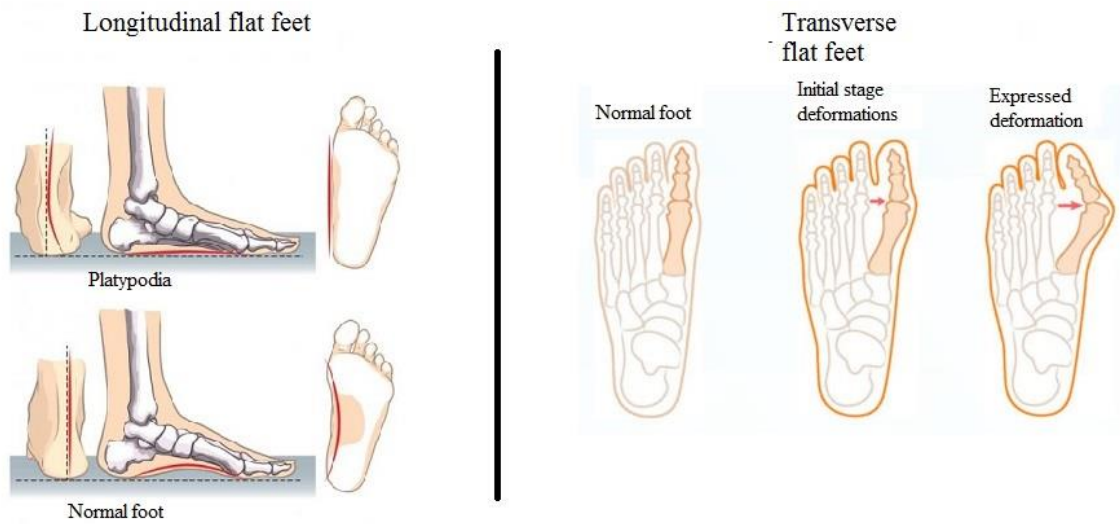
Figure 10 - Features of the transverse and longitudinal flat feet
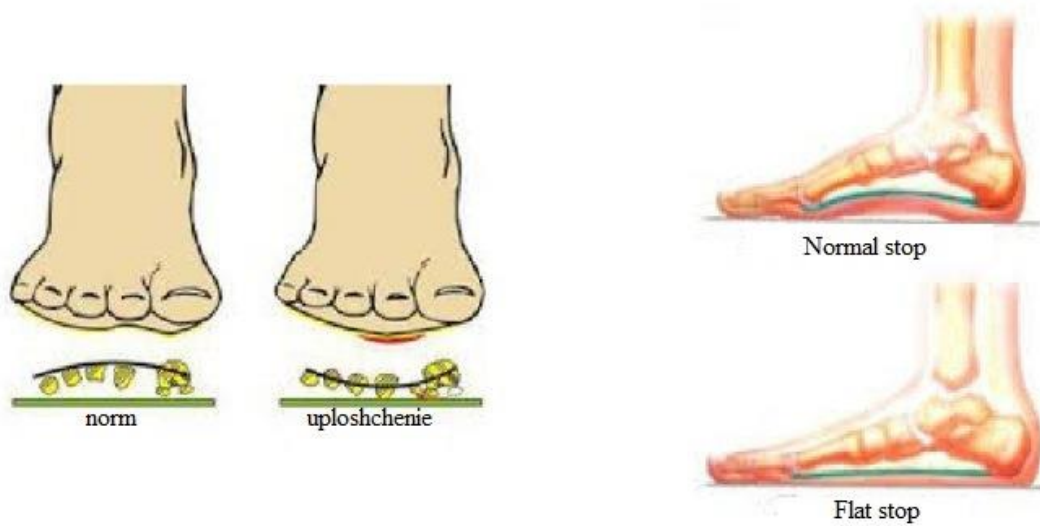
and - the longitudinal   b - transverse

Figure 11. Types of feet in children and adults

Figure 12 - Assessment of flatfoot

Figure 13 - Measuring stop with disabilities patologichiskimi

Figure 14 - Selection of corrective components to the stop with pathological abnormalities
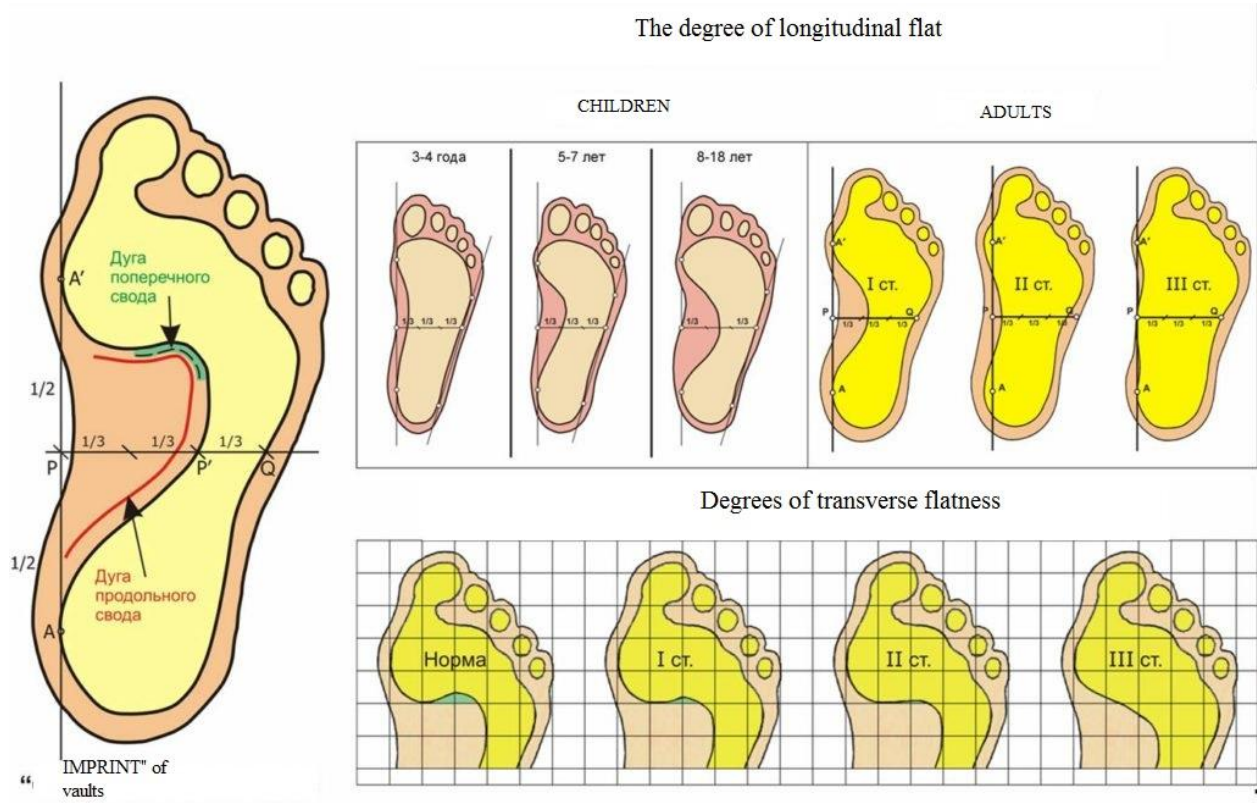
Figure 15 - Feature degree flatfoot feet in children and adults
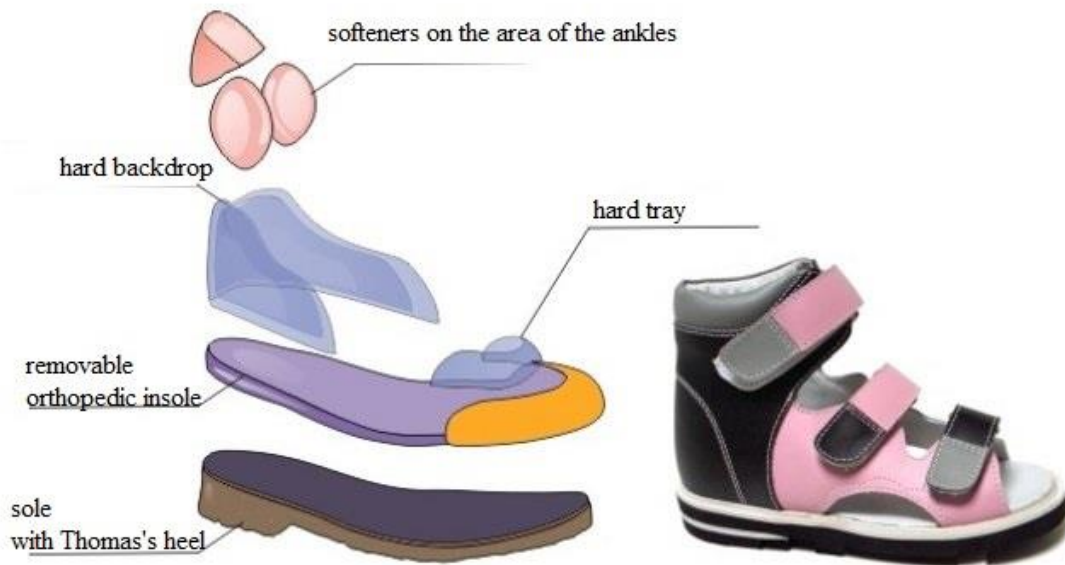
Figure 16 - Diagnostics flatfoot

Diagnosis is confirmed flatfoot plantography - yield footprints. To conduct plantography use plantography. Frame with a stretched on it waterproof fabric on the underside, greased paint. Surveyed child puts his foot on plantography and gets up with a uniform load on both feet. Investigated encircle the foot. Sometime between 3 and 4 fingers at the level of the metatarsal heads to finish. On plantogram connect this point with the center of the heel. The resulting line is the boundary of the cargo and the spring arches. Normally, a set of truck is painted, spring type - free. There are other ways plantogram processing. Figures

plantogram healthy examples (1) and the plane (2) stop. Sometimes it is necessary to clarify the diagnosis X-ray (Figure 12-13).

Recognition flatfoot diseases in children has some features have been stop growing organism passes certain stages of the formation to be considered.

Anatomical studies have shown that infants arch are well expressed. However, a vaulted structure is masked richly developed subcutaneous fatty tissue, and when viewed from the sole of the foot appears flat. From the second year of life, when the child begins to walk and learning to run, there is a real decrease of the longitudinal arch of the foot under the influence of the load on the still immature foot. With 3 years of age there is a significant development and strengthening of muscles and ligaments, so there is a gradual increase in the height of the arch. Thus, the structure of the foot arch structure increasingly gets its external shape. The older the child, the better during the inspection he expressed the arches of the foot. Thus, the planar shape of the foot outwardly at younger children can not be attributed to a true disease flatfoot, but is only a phase of normal development. It should be remembered that the flat foot as the version of the rules can be preserved for a lifetime and not cause thus no functional disorders (a person may do any work on the feet, with the rise of weights, and thus there is no pain). Due to the already mentioned anatomical and physiological characteristics of children when determining the flat foot of the sole of a print can be a mistake, since all or almost all children are flatfooted in early childhood. And if there is any doubt in determining the nature of flat feet, the child (the patient) should be sent for consultation to a specialist - an orthopedic surgeon. Therefore, in addition to the patients' complaints, bone and cartilage skeleton of the foot is to determine the most appropriate location.

Types and causes of flatfoot

Analysis performed studies suggests three basic functions inherent in the normal foot: spring - the ability to elastically spreading under load; balancing - participation in the regulation of late activity during standing and walking; pushing - message accelerate common center of mass of the body in locomotor act. The most important design feature of the human foot is its vaulted structure. Since the longitudinal and transverse arch convexity facing upward, then the vertical posture on the sole pressure is distributed mainly on three points (calcaneal tuberosity, head I and V metatarsal bones) and the outer edge of the sole. Therefore, the effective area of the foot support is less than the area of its sole. foot vaulted to maintain and strengthen the muscles of the lower leg, so its damping properties are determined not only by anatomical features of its bones, but also active work myshts.Chelovecheskaya leg by nature very well designed. human foot in the process of evolution has acquired a form that allows to distribute the load evenly. But the ideal stop occurs in less than half of humanity. According to scientists from the world's population suffer from flat feet 40 to 80%, of which 90% are women.

Distinguish 5 types of flatfoot:

Static flat - 82.1%	The reason - Reduced muscle tone
Paralytic ploskostopie- 5.7%	The reason - a consequence of poliomyelitis
Traumatic flat stopa- 6.2%	The reason - the result of fractures of the tarsal bones
Rachitic ploskostopie- 3.2%	The reason - Rickets
Congenital flat stopa- 2.8%	The reason - Malformations of conception, amniotic constriction, etc..

Types of static flatfoot

*Acquired longitudinal flat feet:*in this disease occurs foot deformity with flattening of its longitudinal arch. Causes of longitudinal deformation of the arch are varied, depending on the state of the musculo - ligamentous apparatus and bone calcium content of external influences.

Traumatic shape deformation - as a result of fractures of the foot and ankle bones, soft tissue damage, reinforcing arch.

Paralytic strain - develops as a result of paralysis or paresis of the muscles that support the arch of the foot. This stops the deformation characteristic of the transferred polio stasticheskih paralysis, spinal cord diseases. Muscles, longitudinal retaining arch (Figure 17).
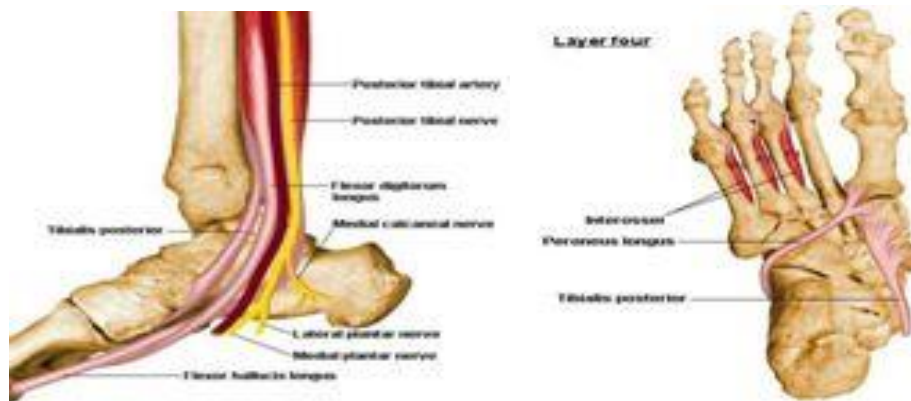
Figure 17 - The muscles that hold the longitudinal arch of the foot of the child

Static deformation stop: It develops as a result of overloading of the foot. The reason may be a rapid increase in body mass (obesity, pregnancy), heavy physical work associated with the load, as well as depletion of the compensatory capacity with age, general atrophic phenomena (bad food, prolonged fasting, et al.).

Diagnosis longitudinal flat justified doctor - orthopedist on the basis of clinical examination, radiography and plantography. Patients pay attention to the appearance of fatigue in the lower extremities. Frequent and recurrent pain in the feet of the longitudinal arch in the legs when walking, to the end of the day. With the development of the disease begin to disturb pains in the hips, waist. As a consequence, gait disturbance, edema appear feet, ankles, feet joints develop arthritis.

For surgical treatment of longitudinal deformation of the foot resort rarely, in exceptional cases. Treatment longitudinal flat conservative advantageously directed to pain relief and the prevention of deformation of the stop progression. Apply a warm foot bath with salt solutions, with a decoction of herbs, foot massage. Therapeutic exercises aimed at strengthening the musculo-ligamentous apparatus of the foot. . This exercise flexion and supination stop, bending and straightening toes, c using objects: a ball, a rolling pin, etc. If severe pain is recommended limiting the load on the foot, often - bed rest for 2-3 weeks, and then a foot massage and physiotherapy . Physiotherapy treatments include paraffin and ozocerite baths, hydrocortisone phonophoresis, electrophoresis of novocaine. It is necessary to regularly repeat courses of conservative treatment for a year. Patients suffering from a longitudinal flat feet, recommend wearing orthopedic shoes, individual orthopedic insoles that allows you to create a comfortable position for the foot.

Cross-acquired flatfoot:

The most common cause of transverse flatfoot - the constant improvement of the static load on the foot on the background of constitutional predisposition, at least - as a result of postponed injuries, diseases of the nervous system. Cross flat - a consequence of failure musculo-ligamentous apparatus in conjunction with the functional weakness of muscles of the foot and lower leg. However, it remains controversial role of muscle weakness in the formation of cross flatfoot, since there is no foot muscles that bring together the metatarsals. However, electromyographic studies have indicated on the primary changes in the functional properties of the lower leg muscles and feet during the development of cross flatfoot. The muscles that support the transverse arch of the foot. Cross clinically flat foot deformity. This large deviation of the toe (1st finger) at the side; osteochondral growths on the inner edge of the head of the 1st metatarsal bone; tensioning tendons of the extensor toes (under the skin on the rear of the foot); callous skin appearance on the sole of the foot; so called hammertoes deformation of the 2nd, 3rd toe. With the development of the deformation of the foot on the protruding towards the inside of the head of the 1st metatarsal bone is constant pressure shoe, which is one of the causes of osteochondral growths on the medial edge of the bone and the development of bursitis of the 1st metatarsophalangeal joint. The deflected outwards 1st finger and Hammer deformed 2nd and the 3rd toe more strongly subjected to the constant pressure shoe edges. This results in the formation of ingrown nail 1st toe, the appearance of blisters on the knuckle region of the 2nd and 3rd finger.

Diagnosis cross flatfoot vrach orthopedic sets on the basis of clinical examination, plantography and radiological investigation. Patients with acquired transverse flatfoot, usually complain of fatigue of the lower limbs when walking or prolonged standing. It is also concerned about the periodically appearing pains in the head of the 1st metatarsal bone, pain on the part of the sole, in the projection head 2nd and 3rd metatarsal bones. All this leads to difficulties in the selection and shoes. Treatment of acquired flatfoot is usually conservative cross - aimed at eliminating pain

and preventing further progression of the foot deformation. The complex of traditional conservative treatment includes: warm foot bath with salt solutions, with a decoction of herbs; physiotherapy and massage the feet and legs.

Useful techniques include physiotherapy ozocerite and paraffin baths, electrophoresis drugs (Novocaine solution, etc.), Phonophoresis with hydrocortisone. Also used are varied, corrective foot, adaptations: silicone cuff worn on the forefoot; interdigital spacers between 1st and 2nd toes; individual orthopedic insoles for continuous wear shoes. When the level 1 cross flatfoot typically use only conservative methods of treatment. Since eliminate deformation develop stop conservative techniques can not use the surgical technique and the correction of the foot, according to indications. In the 2nd and 3rd degree cross flatfoot accompanied by persistent pain, impaired function of the foot (support and walking), progressive deformation of the foot, and failure of conservative treatment methods - use surgical treatment.

The clinical picture of flatfoot:

Clinically, doctors - orthopedists distinguish 5 stages of flatfoot:

1.Prodromalnaya stage. When the first stage is increased fatigue when walking, and by the end of the day there are changes in the foot - sweating, "corns" of corn. There is an increased sensitivity to microtrauma pain after prolonged static load, fatigue towards the end of the day. Decreased physical performance, expressed general fatigue. There may be headaches as a result of reducing the spring function of the foot. The overall result of all this - sleep disturbance.

*2.Stadiya intermittent flatfoot.*Expressed increased pain in the foot by the end of the day. The longitudinal arch of the foot at the same time visually sealed, after a rest recovers. Maybe a certain swelling of the feet and coming (time) contracture of the muscles. By morning, these symptoms disappear. Already at this stage there are changes in the knee joints, swelling in the ankles, blood circulation in the lower extremities, which is manifested in the weight of the legs, orthostatic edema. Pain in the feet leads to a decrease in motor activity: preference is given to the movement of the vehicle. Lack of muscle mobility leads to disruption of the microcirculation, changes in the lymph-venous outflow. At these two stages significant visible change in the feet is not present, and only disadvantages result in the concomitant beautician dermatologist.

The main complaint in this case - thickened, loose tissue in the knee joint, which is not always fat origin: the increase in volume is obtained by mikrovypota of the knee joint, which is also suffering because of flat feet. In other patients, the pathological process is localized in the ankle: he becomes a broad, swelling and losing its elegance.

*3.Stadiya development of flat feet.*Rapidly developing fatigue as a result of overwork muscles. Pain is constant and nagging. Reducing the height of the longitudinal svoda.Otchotlivo visible deformation of leg contours of the navicular bone isolated at the medial (inner) edge of the foot, heel bone is deflected outwards, acting as an ugly protuberance usually bluish-red color, easily injured until scuffs. Ranges gait, as limited range of motion in joints stop.

4.Stadiya ploskovalgusnoy foot. Longitudinal arch flattened dramatically. When walking, the pain appears quickly in the inner ankle. Expressed reflex spasm of the muscles of the foot and lower leg. Tendons in the rear foot pointed. There is a deformation of the thumb to form a "seed" and rough calluses. The latter is often combined with callous borodavkami.Patsient draws attention to the plantar wart and comes to a dermatologist is usually too late when already there is pain. Cause callous warts is also flat. Therefore, without concomitant orthopedic correction treatment may be ineffective.

5.Stadiya contracture flatfoot. Pain in the foot constant. The foot is in pronation cutting position (tread down the inner surface). Visibly disturbed and impeded gait.

Prevention of flatfoot

Prevention of flatfoot in the earliest stages involves the timely and proper treatment of rickets, diseases of the central nervous system, strengthening muscles and capsular-ligament apparatus of the lower limbs using the gym and massage. In the later period, from the year when the child develops a vertical posture, walking, not least the wearing of rational shoe.Walk barefoot or in socks on the floor of pre-school children is harmful. They can walk barefoot on sand, gravel, grass, ramp up and down on peas, beans. For the prevention of flatfoot and strengthen the muscles stop useful insoles simulator Planta, in which REDD is lined with massage elements. These insoles are recommended to wear no more than 5-6 hours a day. It is convenient to put insoles in shoes Plant, which the child is in child care. Time of activity of the child in preschool is approximately equal to the recommended time to wear insoles. Over the weekend, the child does not attend preschool and foot rest. If there are defects foot orthotics are useful to facilitate correction of the defect or to carry out special correction shoes.

Flat feet and foot deformities any aetiology

During the formation and differentiation of the child's foot is a high risk of its deformation. Foot deformity in children due to the fact that the child in an effort to increase the contact area, is trying to

arrange his feet as much as possible - in this case the maximum specter internal departments feet. Impacts and increased extensibility of the ligaments and bone strong enough machine. Particularly high risk of events such as valgus and varus deformation, less common deformity of the toes doctor - orthopedist should be laid potologicheskoe deviation and gives recommendations to parents and child on the activities that they have to be realizovanna with his participation, to facilitate the child his condition and cause the correction availability he abnormalities.

According to experts of the St. Petersburg Scientific and Practical Center of Medical and Social Expertise, Prosthetics and Rehabilitation them. G.A.Albrehta orthotics to 140 size to be produced only individually by appointment podiatrist.

When flatfoot due delayed development vaults shown svodoformiruyuschie insole and polustelki manufactured computation with internal and external longitudinal arches of the foot, which are disposed between the sections and 0,20L 0,60L. The maximum height of the longitudinal arch calculations, both internal and external is identical. It is at the level calcaneocuboid articulation, ie, for sizes from 140 to 200 - 0,36 L in cross section and is from 5 to 7 mm, for the dimensions of 245- 205 with a sectional 0,33L and ranges from 8 to 10 mm. The value relative to the face of deepening the insole in the heel is 3-4 mm for children and small children insoles and 5-6 mm for the rest.

When functional insufficiency musculo-ligamentous apparatus and moderate static nonfixed flat foot and the insole are assigned svodopodderzhivayuschie polustelki manufactured computation with internal and external longitudinal arches of the foot, which are disposed between the sections and 0,20L 0,60L. In this layout the inner arch above calculationsoutdoor. Location calculations maximum internal and external longitudinal arches is at calcaneocuboid articulation similar to that described above. Depending on the size of the display of the outer foot arch is from 5 to 8 mm and inner of 9 to 12 mm.

Conclusion

It was found that the anthropometric study and stop the development of science-based requirements for the design of footwear for children and teenagers is a topical issue for the footwear industry. It was determined that the main factor in the formation of the requirements for shoes for children's shoes should be the preservation of health, as this age are the most vulnerable to vleyaniyu external environment on the formation of their potologicheskih deviations their feet. The place of the shoe in combination of health factors. It is proved that the shoe has an impact on all categories of health: somatic, personal and social.

Using the standard footwear of mass production means of orthopedic technology in loose insoles and other supplementary devices can serve as an effective means of improving its preventive properties, including for the prevention of children flatfoot foot. To do this, specialists in the design and manufacture of footwear of mass production should timely receive current information about the new designs of these orthopedic appliances, as well as the indications for their use.

On the basis of studies to determine consumer preferences revealed that realized now baby shoes with prophylactic properties has some drawbacks concerning both materials and design, and external signs.

Parents of children with abnormalities, including with flat feet, experiencing an obvious flaw in the children's prophylactic footwear domestic production. established its basic design features based on analyzing preventive footwear. Shoes with prophylactic properties of a certain segment of the consumer market of Child and Adolescent shoes. It is distinguished by the presence of design solutions, providing maximum comfort to wear, the presence of special parts (ins anatomical insoles, polustelki, calculations and other flavoring components), a rational evidence-based internal form of footwear and application of high-tech materials in the manufacture of shoes, their tough selection for physical and mechanical and hygienic parameters. On preventive footwear experimenting with new designs and materials to ensure maximum comfort to the child, and the creation of necessary conditions for it to prevent disease and foot deformities.

To solve the problem tight fit of the foot of the child and to provide the necessary rigidity of the heel portion of the shoe upper backs proposed design, retaining the ankle still further by laces, straps or "sticky."

For fixing the ankle proposed construction of the shoe heel, in which a certain stiffness is created at the expense of process parameters, namely the heel portion uses an additional assembly of the outer member, the intermediate member and the lining.

The developed designs uppers with anatomical arch support provide the most effective support arch and correction of the angle of her naklona.Takim, it is important to have a permanent union between a doctor - orthopedist and manufacturers corrective detalny to garanitrovat stop child comfort and high confidence to him and his parents on the prevention education at their child patolgicheskih deviations.

the continuation (second part)

Introduction

Now the problem of the prevention and correction of deviations in the health of pre-school children has become particularly relevant. This is primarily due to the large number of preschool children (84.9%) with different deviations in health status [1]. In this regard, it is increasing the value of the organization of the preventive and corrective orientation directly in the conditions of preschool educational institution (DOW), where the child is an almost daily basis, and where, consequently, it is possible to ensure timely and regular exposure. However, the current system of rehabilitation of children in preschool practically not formed. Marked dissociation of the medical and teaching staff in the provision of correctional help to children, there is clearly a lack of awareness of teachers and parents in the corrective and preventive issues of development, training and education of children . Despite the declaration of the traditional importance of early detection and correction of deficiencies in mental and physical development of children, correctional and pedagogical activity has not become a priority in the actual practice of the education system, although it should be regarded as a mandatory component of the state educational standard [1].

During the organization of the preventive and corrective direction in a preschool special attention should be paid to the prevention and correction of violations of the musculoskeletal system (postural defects, flat feet), because they have the largest share among the functional abnormalities. In particular, the studies found that 67.3% of children of the senior preschool age have flat feet.

The foot is the support body foundation, so it is natural that a violation of this foundation is necessarily reflected in the formation of the growing organism. Changing the shape of the foot, not only causes a decrease in its functionality, but also, more importantly, changes the position of the pelvis and spine. This adversely affects the function of the latter and, consequently, posture and general condition of the child. Insufficient development of the muscles and ligaments stop adversely affects the development of many movements in children, leading to a decrease in motor activity and can become a serious obstacle to many sports . Thus, strengthening of the musculoskeletal system, and in particular the foot, is of great importance.

It is interesting to note that the formation of the right arch of the foot in children, as well as the prevention and correction of functional impairment attached great importance to the national traditions of education. For example, in the preparation of the child to the development of skills and pryamostoyaniya walk to strengthen the muscles of the foot has been taken lightly poshlepyvat on the soles of his feet, saying:

Kui, Kui, kovalok, horseshoes Chebotok: On a small nozhkuZolotu podkovku.Poday molotokPodkovat Chebotok!

And although much of today is lost for centuries selected by the invaluable experience of folk pedagogy, such pestushki, nursery rhymes, rhymes, so-called small folklore genres, reflect the tradition and philosophy of its founders.

At preschool age stop is under intense development, its formation is not completed yet, so any adverse external influences may lead to the occurrence of certain functional abnormalities. However, in this age period characterized by great plasticity body, so it is relatively easy to suspend the development of flatfoot or fix it by strengthening the muscles and ligaments of the foot.

Successful prevention and correction of flat feet are possible based on the integrated use of all means of physical education: hygiene, natural and health factors and physical exercise (see table.).

Main part
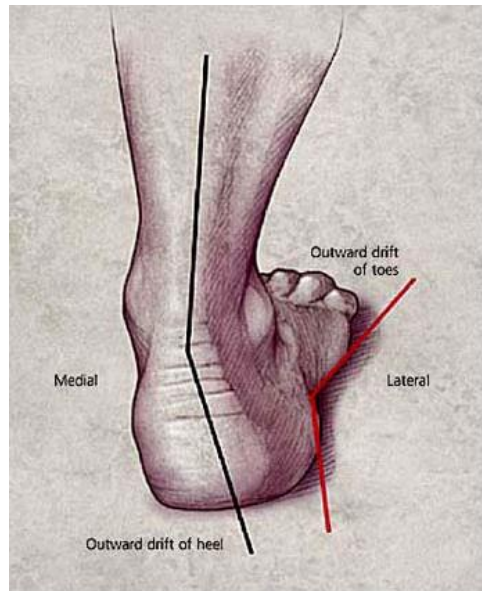
Valgus foot deformity in children

Figure 1 - Ploskovalgusnaya stop at ditey

"Flat-valgus setting stop" - that this diagnosis is very often hear parents of pediatric orthopedics. If the word "flat" everything seems to be, it is clear that the second part of the diagnosis - "valgus" is not so obvious. And in general, what is this disease and what to do requires some explanation. Valgus - simply put - X-shaped installation feet. Everyone knows what "iksikom feet" - the same thing, and with the feet. Foot flattened and "littered with" inside - this is a flat-valgus feet.

The diagnosis of "flat-valgus (or X-shaped) production stop" is placed sufficiently often. With this deformation flattening of the foot and the like fall down inward. The reason - the weak ligaments child's feet do not always withstand the body load. Accordingly, the flattened longitudinal arches, and the foot inner edge sags, anterior removed. If you look at a photo of flat feet in children from above, it will be clearly visible to the letter "X". The first signs of the X-shaped setting foot can be traced back at the very first steps. The main thing - immediately identify violations, to conduct timely treatment of foot deformities.

Varus foot deformity in children

Signs varus setting foot - bent in an O-shape knee joints, they are not joined together in a straight line. Hence, when walking child will rely on external arch of the foot. Such strain most common in infants and in children with cerebral palsy, brain tumors, diabetes.

Timely diagnosis of pathologies and successful correction of clubfoot treatment of flat feet in children is possible - it is necessary to visit a podiatrist and implement its recommendations.

a   b

Figure 2 - The characteristic varus foot deformity in children a) X-shaped b) "littered" inwards

This happens because weak ligaments child's foot can not withstand the load of the body. Flattening of the longitudinal arch leads to sagging of the inner edge of the foot and disposal of the anterior. Since forming X-shaped installation stop.Pervye features flat-valgus foot installation appear simultaneously with the first baby steps.

Customized orthotics can effectively adjust the flat-valgus feet and installation in conjunction with a children's orthopedic shoes provide the foot of the child the correct position. Very important in the treatment of a strengthening of the musculo-ligamentous apparatus of the foot. Therefore, therapeutic exercise for feet is a required component.

Features flat-valgus deformity of the foot

As you know, stop adult has a vaulted structure. Longitudinal and transverse arch operate spring, a balancing function, and are also involved in adaptation to the supporting surface of the foot when walking. The arches of the feet of the child up to 3 years have not yet formed. Due to the significant amount of stop subcutaneous fat child at this age it seems almost "flat". With the growth of the child height of the arch increases, and for each age group is characterized by a certain height of the longitudinal arch. [2]

Since, on the foot and, in particular, on the plantar its surface located projection "of the various organs of the human body. From this perspective, to maintain a normal state of health is necessary to use only rational footwear that promotes the normal life of the people. This is especially important for growing children's feet, the more -. feet with different strains According to various studies among the most common foot deformities is flat and one of its variants - with a flat-valgus. Tops She accompanied the following deviations:

flattening of the longitudinal arch; valgus position of the hindfoot;

abduction-pronation position of the anterior [3].

The maximum percentage observed in children of primary school and preschool age. However, the physiological flat feet, even in the age of 3 years, should be distinguished from the pathological, when the reduction of the longitudinal arch combined with a valgus deformity of the foot. If the angle of heel valgus deviation of the three years of the child's foot more than 70, then we can talk about the flat-valgus foot. An indirect indication of the foot valgus plane child can be considered typical wear heel, preferably at the inner edge of the shoe, and deformation backdrop. Very often the child with flat-valgus feet, complaining of pain in the knee and ankle joints that occur during exercise, he is tired of walking and running. Flat-valgus deformity requires stop of orthopedic treatment. Lack of adequate treatment, as a rule, leads not only to a change in shape of the foot, but also to the spinal deformity: violation of posture and scoliosis. Flat-valgus deformity stop - very frequently occurring type of deformation. Thus the arches of the foot and heel of the foot is reduced deflected outwardly. More common in children. This gives rise to fatigue while walking, pain in hip and knee joints, swelling. Shoes tend to be distorted,

deformed, worn inside of the heel. Flat-valgus deformity, if untreated, usually leads to violation of posture and scoliosis. The result - a pelvic imbalance, the shortening of one leg, back pain, intervertebral hernia and other problems. The most common cause plano-valgus deformity is hypermobility of joints, weakness musculo-ligamentous apparatus. With age, may develop degenerative changes of bones and joints of feet, poor circulation. Treatment, especially at an early age, aimed at strengthening the muscles of the arches of the foot and lower leg. The survey orthopedist will determine the degree of deformation, select the desired program stops correction and manufacture customized orthopedic insoles or orthoses required for a particular patient. We recommend you consult our experts at the numbers listed at the top of the site. Also, please note that arranged appointment system that will allow you to get the most comfortable service in our salon. For a long time there was no generally accepted clinical classification plano-valgus deformity. Known classification were based on the expressed signs of deformation and the stages of its development. For example, PP-known classification of the damage which is based on the main clinical forms of flat feet, representing a number of gradations that affect the choice of treatment:

- prodromal form of flat feet; intermittent flat;
- simple form of flat feet; flat, complicated abduction
- forefoot; contracture flat[3].

Additional classifications developed flat-valgus stop most widespread dysfunction classification posterior tibial tendon (SZBBM) Johnson KA and Strom DE Myerson modifications in []. At the heart of it lies the connection between the elastic flat-valgus foot dysfunction and the development of posterior tibial tendon - the more pronounced the plane valgus deformity of the foot, the faster the degenerative changes in SZBBM more rigid and resistant is a flattening of the inner longitudinal arch. To the proposal of the three stages of development of a plano-valgus deformity Myerson MS added a fourth step, which is described degenerative changes in the ankle joint. This classification is sufficiently informative, because it includes the set of attributes valgus plane and the stage of its development. Classification flat-valgus foot deformities in children. Statistically, almost every kid under 5 years of age, having a developmental disorders stop (40-80%), also has a diagnosis of "flat-valgus deformity stop".

In children, the flattening of the arch of the foot, usually occurs at a time when the baby is just taking its first steps; this is due to quite severe loads on the legs when trying to make a move. Of course, we can not wait on the baby perfectly correct statement of the stop or gait "from the hip" as soon as he first stood up on its feet.

Plano-valgus is accompanied by the following variations:

- flattening of the longitudinal arch;
- abduction-pronation position of the anterior;
- valgus position of the hindfoot;

The maximum percentage observed in children of primary school and preschool age. Although there are cases where the diagnosis can be considered as unauthorized.

The shape of the foot, which was formed in the course of evolution, provides an even distribution of body weight. Foot bones, strong interosseous ligaments are connected, form its vault, whose role - to provide maximum cushioning movements during running and walking. Convex arches are oriented in two directions - longitudinal and transverse. Therefore, in a normal adult human foot three points of support - the head of the first metatarsal, metatarsal tubercle and the fifth metatarsal bone. In children, the flattening of the arch of the foot, usually occurs at a time when the baby is just taking its first steps; this is due to quite severe loads on the legs when trying to make a move. Of course, we can not wait on the baby perfectly correct statement of the stop or gait "from the hip" as soon as he first stood up on its feet. As a rule, the first complaint parents have when a child takes its first independent steps. In this case it is necessary to clearly distinguish between the physiological flattening of the arch of the foot of the child, who has not yet reached the age of three years, and the actual flat-valgus deformity, which already requires monitoring podiatrist. Up to three years in children on the plantar aspect of the foot has a "fat pad", so by simple visual inspection of the foot arch is not visible. But it will be noticeable if you ask the kid to stand on tiptoes. Bone in the child continues to be formed before the 5-6 years, so that only in this period makes sense to start talking about the absence or presence of the baby itself plano-valgus deformity.However, it should be borne in mind that the flat-valgus feet in children can lead to negative consequences such as:

- severe curvature of the spine;
- persistent pain in the legs;
- "Adult" disease - osteochondrosis, arthritis.

In some cases, the diagnosis of "valgus foot" put the child back in the hospital. In this case there is a congenital disease character (vertical ram).

Causes of foot deformities:

- dysplasia, connective tissue (78%).

Contaminated water and air, low-quality food products leads to the fact that the connective tissue, which is the basis ligament apparatus of the joints (and all other organs) formed correctly.

- wrong baby shoes (soft model with a flat sole, not able to properly fix the leg).

- the baby is not engaged in physical training in preschool uchrezhdeniyahi family.
- Genetic and endocrine (diabetes, thyroid disease) disorders.
- osteoporosis (bones lesion).
- various foot injuries.

Doctors allocate a number of theories with which to explain the etiopathogenic mechanisms:

- anatomical theory;
- vestimentarnaya theory;
- static-mechanical theory;
- Theory of hereditary muscle weakness;
- theory of constitutional weakness of connective tissue.

Physicians are three severity flat-valgus stop: an easy, medium and heavy. So-called stop - Rocking (vertical ram stop paperweight) - the most severe degree of deformation. Revealed she immediately at birth, the incidence of detection - 1 in 10,000 newborns. Etiopathogenesis of this deformation hitherto not completely understood. The most likely cause of the deformation doctors isolated malformation germ and delay its development in one of the stages of formation of the embryo.

foot parameters are normal:

if to hold two lines - the lower contour of the calcaneus and first metatarsal - so that the vertex angle was in the region of the navicular bone, this angle must be 125 °;

longitudinal arch height - 39-40 mm;

valgus position hindfoot - from 5 ° to 7 °;

calcaneus inclination angle with respect to the support plane - from 20 ° to 25 °.

The height of the longitudinal arch of the foot in children of preschool age in the norm may be 19-24 mm.

Mild characterized by the following parameters:

- the height of the longitudinal arch of the foot is reduced to 15-20 mm;
- angle roof height is reduced to 140 °;
- calcaneus angle - 15 °;
- hindfoot valgus position - up to 10 °;
- allocating forefoot (8 ° -10 °).

Average rate:

- arch reduced to 10 mm;
- height of the arch is reduced to 150 ° -160 °;
- angle calcaneus to 10 °;
- valgus position of the hindfoot and retraction of the front - to 15 °.

Severe:

- arch of the foot is reduced to 0-5 mm;
- angle of the foot arch height reduced to 160 ° -180 °;
- angle calcaneus - 5 ° -0 °;

- valgus position adjustable diversion of the front card and - more than 20 °;

- deformation under severe rigid and can not be corrected;

- constant pain in the joints Shoparova.

-Osnova stop, "foundation" of our body. And if the foundation of the curve, and the smooth, reliable home on it does not build. Flat-valgus deformity stop entails valgus (X-like) deformation of the knee and ankle joints, incorrect positioning of the pelvis, incorrect posture. Curvature of the spine and extremities axes leads to an overload of the muscles that are unsuccessfully trying to hold the body in the correct position. As a result - the appearance of pain, the early development of arthritis, degenerative disc disease. Appropriate measures should be considered for the timely prevention of the progression of adequate orthopedic SNA software, the need for which, according to different authors, have up to 78% of the population. Traditionally, orthopedic providing limited purpose of orthopedic shoes or insoles invested in normal shoes. Orthopedic insoles are made of prosthetic - orthopedic company. In recent decades there have been attempts to create, in particular, loose orthopedic insoles for monkey - lichenie consumer. However, limited design options and a number of other shortcomings are not allowed to significantly change the nature of the orthopedic provision as a whole. The reason for the flat-valgus feet of the child, as a rule, is a joint hypermobility. Weak muscles and ligaments do not "hold" the weight of the child and there is pronation (valgus deviation) of the foot. Treatment of flat-valgus feet of the child held in a complex. It is necessary to carry out activities aimed at strengthening the musculo-ligamentous apparatus involved in svodo- hold. It is a complex of medical gymnastics, massage, physiotherapy. It is necessary to carry individual orthopedic insoles, corrective flat-valgus foot child.

When designing the children's shoes the requirements of comfort and convenience, highlight. The quality of children's shoes is determined not only by its durability and relevant aesthetic design, but comfortable enough, which refers to the ability of the shoe to provide conditions for the normal functioning of the foot [4]. Comfortable shoes is a comprehensive indicator of the properties, which can be subdivided into three groups:

- the first group consists of the physiological properties of providing normal biomechanical functioning of the foot;

- the second refers hygienic properties that affect the safety and the harmlessness of the conditions of her toes; third characterizes the footwear in terms of its rationality and amenities represents anthropometric characteristics;

- the third group properties include the spacer and the supporting rigidity priformovyvaemost and compression foot shoe, which depends on the magnitude of occurring pressure.

Special interest for shoe comfort evaluation index"Pressure shoe upper on the foot." The pressure shoe upper on the foot and the character of its change during wear primarily depend on the dimensions and internal forms of footwear defined size and shape of pads. Furthermore, due to increasing the size of the foot creates an additional pressure caused by the properties of the workpiece material and its shoe design. It is known that in the motion volume increase unshod foot in the metatarsophalangeal articulation averages 4%. The initial size of the foot and do not remain constant throughout the day. Their change is influenced by the duration and intensity of the walk, as well as the microclimate of vnutriobuvnom space. Increasing the temperature and humidity of the foot leads to an increase in its volume, and consequently affect the compression foot shoe size. Excessive pressure adversely affects the physiological state, which is manifested in a change mode vlagotemperaturnogo [5], the offset center of gravity, the accumulation of static electricity on the skin. As a result, the child experiences discomfort manifested in fatigue of the lower limbs and the occurrence of pain. In addition, prolonged pressure on the shoe upper forefoot promotes various abnormalities. Enhance comfort of the group shoes contribute soft edges and gaskets used in models of uppers. Equally important in the development of comfortable shoes are materials used for the top and bottom parts, which must be different softness and flexibility, as well as fastening methods. Bespodkladochnoy for manufacturing shoes as the materials can be used elastic top skin, including the skin of increased thickness, and artificial textile materials, characterized by properties similar (especially hygroscopic) to elastic natural leathers. On comfort (in particular, hygroscopicity) influences lining used in shoes. This usually chrome leather tanning drum or dyeing aniline light colors, and textile materials. Thermoplastic backs and toe must have the softness and elasticity to be dimensionally stable. One of the main conditions that reduce the rigidity of the spacer shoe, a design shoes children's shoes. Forms the toe portion recommended for children's shoes - advanced oval and rounded square - predetermined stability shoes. Reference comfort as an integral component of the shoe reflects the notion comfort conditions most favorable interaction of the plantar part of the foot with a shoe bottom of the system which are determined by an array of optimal parameters obtained by contact normal human foot having an average weight of soil. The complex evaluation criteria reference comfort three basic, according to which should be administered design changes

calculated characteristics and chosen shoe bottom materials system, namely:

- -distribution pressure on the supporting surface of the foot (criterion - the pressure distribution);
- -reaction on the heel portion side in the base body mass transfer phase on the support leg (criterion - suspension);
- -voltage arising in the plantar muscles and ligaments of the foot under load (test force - raspornoe).

The transition from the interaction of the foot with the ground elastoplastic to contact with a rigid system shoe bottom - asphalt (concrete) causes the appearance at selected sites plantar portion of high stress concentration, as the interaction is realized through a reduced force of about 1.3 times the contact surface. This makes it necessary to lead to an optimum pressure distribution due measurable neniya-elastic and geometric parameters of the support. One of the essential conditions are respected for the design of shoes with the supporting comfort should be basic setting profilirovannoy insole with special liner and made of foamed material, allowing it to easily priformovyvatsya foot. The problem of designing comfortable shoes can not be solved without the revitalization of the related industries, developing for this shoe materials and products. Indices of comfort of footwear, such as its convenience, ease, softness, elasticity can be only achieved, provided that the components and articles of footwear materials have corresponding properties. It determined that the footwear is one of the factors affecting the formation, development and normal functioning of the body of teenagers. Thus, the flattening of the foot leads to a violation of posture, spine diseases, wrong location, and hence the work of internal organs. Reducing the physiological curves of the spine (flat back), especially in combination with flat feet, leads to permanent brain microtrauma impaired memory and attention. Such a chain can be built, and in the analysis of the effect of footwear on the emotional development of adolescents, on which depend the personal and social health. To do this, you need to understand how the process takes place social child gets older, and what importance is its appearance, and hence the consumption of items such as clothing and shoes. [6]

Corns, abrasions, crooked fingers and feet in general, etc. Objects of consumption, which form the external image of the teenager are not just elements of the costume for him, but also a way to express their individuality, to express their concerns and to identify membership in a particular community. The absence of a teenager's wardrobe shoe style inherent to his comrades, can not serve as an understanding on their part. A conflict in relationships with peers generate heavy experience, teenagers are considered as a personal drama, therefore, reflected in the personal and social health. Another possibility is the effect of footwear on the psycho-physiological and social health of adolescents lies in the characteristic of this age of increased self-criticism of its external data. shin completeness, big or small size of the foot, the disharmony in the leg proportions - all this can be a complex and an adult, but like a teenager discontent lead to more severe violationsemotional state [7].

The key elements of such displays include:
- Knee compression at dense spacing ankles up to 5 cm or more;
- with X-shaped legs there is a marked kink the joints;
- toes and heel pointing up, and the stack axis substantially curved;
- deformed foot negatively affect the child's condition: sore legs when walking, swelling appear in the second half of the day.

When the pain in the legs, rapid wear of the shoe should be carefully examine the feet of the child and to check whether he ploskovalgusnoy strain symptoms. At the slightest suspicion of problems with joints and muscles need to go to the doctor - orthopedist.

Correct flat valgus foot help corrective shoe models, stated on the drawings.

Figure 3 - Correction parts for deformation of the big toe
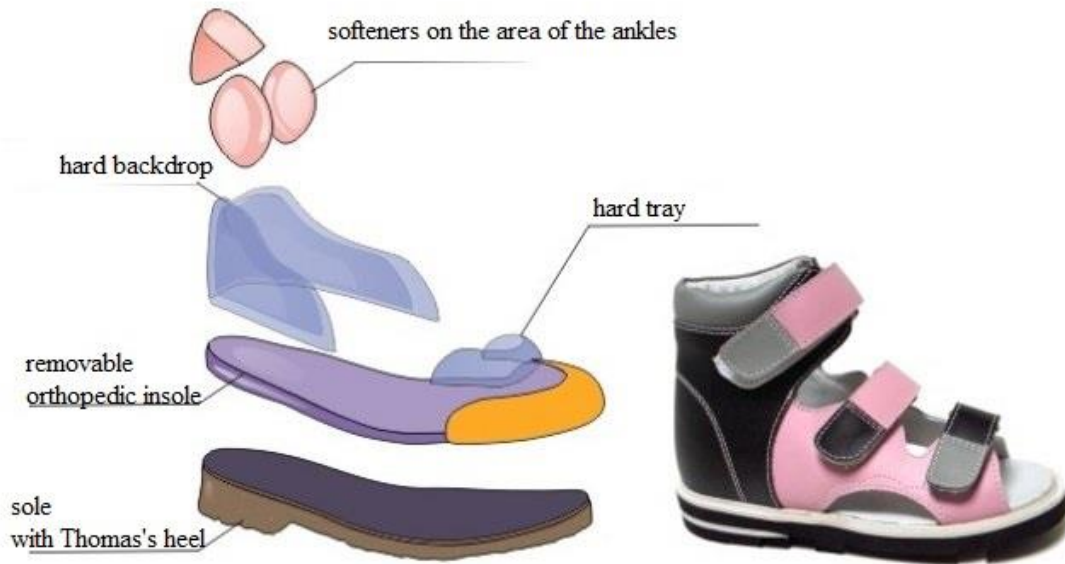
Figure 4 - Characteristics of corrective components for children with varus and valgus deformities of feet

Figure 5 - Types of corrective components for children with abnormalities

Another common disease in children is ploskovarusnaya feet deformity. When ploskovarusnoy strain at which characteristic codes of curvature and the stop axis we are talking about clubfoot. But the difference between these diseases is still there. The figure mentioned characteristics of the foot heel installation

a   b   in
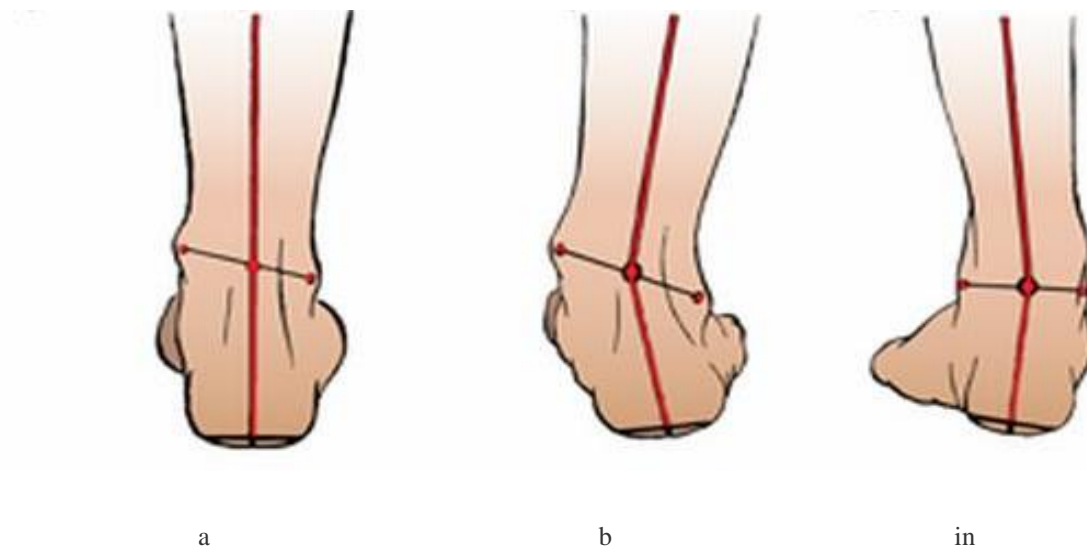
Figure 6 - the characteristic setting foot heel and) proper installation b) in the heel valgus) heel varus

Antivalgusnaya shoes - this is special footwear for children with valgus deformity of the foot.

Parents do not have to worry about that special shoes will spoil the appearance of the child: corrective sandals, shoes, boots outwardly no different from the traditional models. Fashion models for a long time to come, made only 20 years ago, replaced by ugly antivalgusnoy shoes. (picture)

Antivalgus securely locks the ankle and astragalocalcanean joint at the foot ploskovalgusnyh changes.
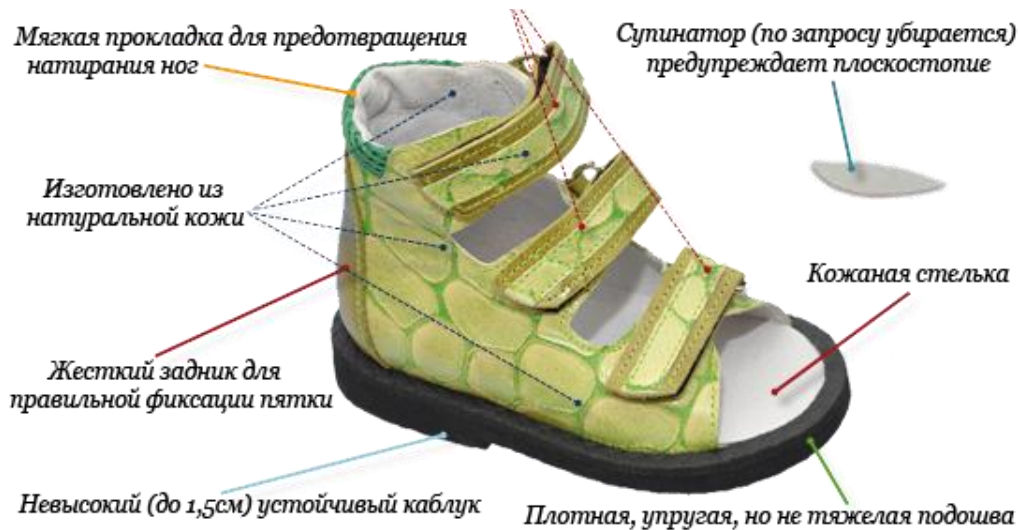
Figure 7 - Corrective anti hallux orthopedic shoes

The special design of the shoe is provided protivovalgusnoy:

- adjusted mobility bone joints, stopping the deformation;
- corrective shoes are high ankle boots, allowing the ankle to fix firmly;
- need insoles in orthopedic footwear, so all models have a removable insole that ensures correct laying open of the longitudinal arch of the foot of a child;
- in severe pathologies in special laboratories manufactured insole, arch support;
- parts for orthopedic products is made to order.

Instep - special protrusion, the production of which generates master convexity given anatomical features of the legs of the child.

Thomas orthopedic heel ensures correct installation and helps to prevent eversion of the foot inside. In the manufacture of the heel are made longer on the inner side [8].

The most common disorders associated with cerebral palsy lower limbs are flat, hollow foot, hallux varus and foot deformities, paresis of the foot, a shortening of the lower limb, different deformation fingers. This requires the inclusion in the design of certain add-ons shoes. Shoes for children with cerebral palsy should be made of high quality materials. Distinguishing features include a specially designed shoes that have a wide forefoot to provide a natural position of the toes and the foot of the child is not deformed and took a comfortable position. The shoe sole is recommended to use with sufficient resilience and flexibility. Some models have a preventive outsole with a special heel having an elongated krokul to support and unloading of the foot. This heel, extended from the inner side of the sole. This strengthens the sole under the middle part of the foot and prevents it from heaping up inside. Using the heel helps in the prevention and treatment of foot defects. Orthopedic patients with droops software stack defined active mobility in the ankle and foot by the presence of lateral deviation. In cases where the dorsiflexion in the ankle kept and no lateral deviations of the foot, is assigned to shoes, combined with cuff and rubber rods. If the non-fixed sagging and there is very little lateral deviations of the foot, it is recommended to use orthopedic shoes in combination with the rubber cuff and rods, as well as shoes with double lacing. Expressed lateral deviations droops feet require destination orthopedic shoe with rigid sided bertsami and removal of the heel, and mezhstelechny layer must be supplemented pronator or instep. For fixed sagging or excessive mobility in the ankle boots are recommended with bilateral or circular rigid Burpee. Circular hard Berecz along with more reliable fixation creates some front stop required for rolling. The species range of products is limited. Constructs recommended for children with CP D are high boots and sandals. The height of the shoe is designed based on the doctor's prescriptions and are presented in Table. 3.2 in accordance with the GOST P 54407-2011.

Table 1 Calculation of parameters of individual orthopedic footwear manufacturing

Sex and age group footwear	The height of the shoe, mm, not less than
	boot
For toddlers	0.3 / + 53
small children	0.3 / + 59
Preschool	0.3 / + 63
For school-girls	0.45 /. + 50
For school-boys	0.4 / + 55
Maiden	0.3 / + 45
boys'	0.3 / + 45

Practice has shown that the average height of the shoe is overestimated by 50 mm from the outer ankle bone. The height of the heel portion elation - 20 mm. For children's shoes, this is the height of the heel optimalnoy.Zhestkie demands are made to form the toe of the shoe. The shape of the toe to be anatomically correct, as much as possible conform to the shape of the foot of the child. It should not deform and squeeze the toes. For the convenience of putting on

shoes ankle boots, as a rule, designed shorter, which provides the maximum degree of opening of the shoe. Laces are the most effective method for fixing because the data structures shoe important maximum fixing child's foot in the shoe and its adjustment according to the individual parameters of the foot. An important role in the shoe for children with valgus and varus deformities stop playing Comfortable anatomical footbed.

Suitable methods for fixing the shoe on the foot are shown in Fig. 3.3.

Fig. 8 - Models of shoes for children with valgus and varus deformity of the feet: and - with laces; 6 - with buckles; in - with a fastener "Velcro"

Mandatory element layout supplementary insole is set to maintain the arch of the foot. Furthermore, based on the doctor's prescriptions for the bottom parts designed instep or pronator finger or heel of foot. Construction spacers in consideration shoe also has its own characteristics. This necessarily high Berecz hard, hard backdrop with elongated wings. When designing the shoes are used in two basic designs: shoes with vamp their configuration and their configuration bertsami. The front line of vamp shifted toward the toe for a more complete "disclosure" of the

tongue, which is important when putting on and removing the shoe and its fixation on the foot. Awesome hard Berecz made from rigid leather or plastic. Its purpose - to secure the foot and ankle. Therefore, it can be strengthened. One of the most common designs, as studies have shown, are shoes with their configuration bertsami sporty style with a short vamp. The material used for padding can be used textiles, natural leather Lining, villous, or fur, depending on the season. The list of materials is shown in Table. 2.

Table 2. List of materials used to make orthopedic shoes for children with varus and valgus deformities stop

parts Names	Materials and designation of normative and technical documents
External parts top	Leather shoe uppers GOST 939, GOST 3717, GOST 1838 GOST 9705, skin elasticity; footwear and drape cloth in accordance with GOST 28000, cloth shoe
The internal components of the top	Leather for shoe lining in accordance with GOST 940, GOST 1838 for lining cloth of footwear according to GOST 19198, GOST 28000, GOST 29298 and technical documents, knitted fabrics for technical documents
Spacers top. Mezhpodkladka	Fabrics for mezhpodkladki GOST 19196, GOST 29298, cotton cloth with hot-melt coating mezhpodkladki
toe	Leather according to GOST 29227, GOST 1903 nitroiskozha T-shoe according to GOST 7065, elastic and thermoplastic materials for the toe cap - for technical documents
backdrop	Leather according to GOST 29277, GOST 1903 cardboard according to GOST 9542, nitro roiskozha T-shoe according to GOST 7065, the thermoplastic material for the backdrop - technical documents
The outer bottom parts. Sole	Leather shoe bottom according to GOST 29277, GOST 1903 Rubber porous plate according to GOST 12632, porous rubber plate lightened
rigid piece	Leather for shoe bottom according to GOST 1903 GOST 29277, leather saddlery GOST 1904 (on the bill back)
soft part	Skin according to GOST 939, GOST 940, GOST syromyat 1562 Russia leather saddlery in accordance with GOST 1904
metal part	65G Steel grade according to GOST 14959, I2X1BH10T grade steel according to GOST 5632, 40 steel grade according to GOST 1050, aluminum GOST 21631
Accessories. Attaching the shoe on the foot	Eyelets, hooks, rivets, eyelets, buckles, clasps, frames, metal, shoe laces, buckles, textile, shoe elastic belt - Technical Documents
Insole molded (at mezhstelechny layer)	Skin according to GOST 29227, GOST 1903 GOST 1838 GOST 939, Russia leather saddlery in accordance with GOST 1904 for the lining leather shoe according to GOST 1904 for the lining leather shoe according to GOST 940

In the design of the top parts should highlight the following features: the angle between the upper edge of the tibia and the ankle line of inflection should be close to 90 ° for greatest distance beneath the laces, the expense of which is largely provided by the fixation foot. By increasing the requirements for the degree of fixation on the foot in the footwear construction may be made a combined method of fastening the shoe. It should take into account the allowances for spacers. The thickness of the spacers may reach 2-3 mm, thus to specify the volume recommended to add stop 0.5-1 cm. All this considerably affects the quality of operation of the shoe. The design can rub his leg in the tibia due to the stiffness of parts, so the presence of a small soft edge is recommended. It is not recommended to design the soft edging is too large, since it can reduce the degree of fixation on the foot. Development of designs based on consideration of the requirements ensure high quality of the relationship between consumer preferences and medical restrictions. Comfortable models have the so-called orthopedic heel of Thomas, which extended from the inside of the foot for support

in the middle section and prevent zavalivanija foot inside. The molded outsole with a heel Thomas [9].

Outsole with a heel Thomas

An important role in the shoe for children with cerebral palsy disease play a properly fitted shoe design. Footwear must meet the requirements of GOST and have specific structural elements specific to these models. For orthopedic footwear characterized by extreme parts shapes and sizes. Distinguish special parts: soft, hard and metallic, as well as mezhstelechnye layers. The special soft parts include extra laces, broaching belt side inner belt traction cuff. The special rigid parts include: heel, toe, vamp, polusoyuzka, flank, tongue flap, ankle boots, curly top insole. These parts are additionally fixed shoes and increase its dimensional stability. Hard heel - an intermediate or outer piece orthopedic shoe upper, an calcaneo- gelenochnoy portion.

hard backdrop

Along the length of the wing are distinguished with the extension of the hard heel gelenok through either extension to the fifth finger, depending on the destination of the doctor - orthopedist.

Renewals hard backdrop, structural elements

Hard Berecz side portion increases the strength and often used in orthopedic shoes.

Unilateral hard Berecz - detail located in pyatoch- but gelenochnoy-part orthopedic shoe.

Bilateral hard Berecz - internal or intermediate piece is located in the heel-part gelenochnoy orthopedic shoe. Detail has protrusions on the side surfaces above the ankle bertsami restricting the mobility of the subtalar joint.

Bilateral hard Berecz

Circular corset - detail orthopedic shoes covering the back, side and rear of the foot and lower leg above the ankle, which limits the mobility in the ankle joint.

By mezhstelechnym layers include: laying open the vaults, Kosok, reverse Kosok, cork, pronator and supinator. Mezhstelechnye layers - a top inner parts orthopedic shoe for redistribution of load along the plantar surface of the foot. They are located between the figural and the insole.

Realize vaultsand it has a minimum thickness necessary to align the relief calcaneo- gelenochnoy track portion orthopedic pads. It serves to maintain the longitudinal arch of the foot. Insole with computation arch (in block form).

laying out a set of

Kosoklocated in calcaneo- gelenochnoy portion has a certain thickness in the heel portion, which comes to naught in the beam parts. Kosok looks like a wedge and serves to compensate for the shortening of the leg. Koski are steep or sloping in one direction or another (outer, inner, forward or backward).

Bunglocated under the entire plantar surface of the foot. The thickness of the beam tube and heel portions is the same. Wedge-shaped plug to compensate for the shortening of the lower limbs in children are not used to prevent abnormal setting foot in equinus position vicious.

Bung

pronator - insole part that lifts the outer edge of the foot. Pronator with computation arch (view from the insole pad surface).

pronator

supinator - insole detail that raises the inside edge of the foot.

metatarsal arch support

Distinguish pronator or supinator for the entire track, the front or rear card mezhstelechnogo layer. Design shoes vary in purpose and operational sex and age group and possible accompanying deformation. Therefore, the design has its own characteristics [10].

Types of orthopedic footwear
2.1 Antivalgusnaya shoes
2.2 Antivarusnye model
2.3 Stabilizing orthopedic shoes

With severe foot deformities appointed complex orthopedic shoes for children, which is mainly made to order. I found its use in footwear and rehabilitation programs for disabled children, including varus and valgus deformities of feet (see Figure 9).

Figure 9 - a complex type shoes for children with disabilities with varus and valgus deformity stop.

The main purposes for which the appointed orthopedic shoes for children with varus and valgus foot deformities include:

• position correction of the ankle and foot and maintaining it while walking;

• correct load redistribution to certain parts of the foot on all foot;

• compensation of anomalies, such as shortening of the legs;

• improved support and facilitate movement.

The main difference is the presence of footwear special shoes designed for the particular strain. Orthopedic shoes for children with cerebral palsy should possess the following characteristics:

• the presence of a high backdrop - it is necessary to secure the ankle, so should be the optimal degree of hardness;

• high availability and rigid Berz used to prevent zavalivanija foot when walking;

• must be low heels and removable insoles - Update must be supplemented by special items.

Also, shoes should be comfortable to put on and removed, so it is a good detection rate is also an important factor. Types of orthopedic footwear for children with varus and valgus deformity stop.

Figure 10 - Orthopedic footwear for children with varus and valgus deformity stop

As a rule, complex orthopedic shoes for children with cerebral palsy is classified into three large groups. The division is based on the type and complexity of footwear disease for which it is intended. Thus isolated [11]:

Antivalgusnaya shoes

The main purpose of its application is X-shaped production stop due to the fact that the ligaments of the foot can not stand a child's body. This may be the result of excess body weight or weak muscle tone arch of the foot. The inner edge of the foot with the slack, and discharged to the outside front. Antivalgusnaya shoes is characterized by:

- bilateral tibia high rigid type providing stabilization ankle in a vertical position;
- an elongated inner tibia, holding the heel of zavalivanija;

- instep with longitudinal tabs needed to support the arch of the foot.

Antivarusnye model

Designed for deformity correction, in which the joints of the knees are bent to the side. As a result, the child has to rely on external arches of the foot when walking. This diagnosis implies a shoe with a rigid fixation of the hindfoot while diverting the front. Such footwear should be equipped with:

- high backdrop to a third ankle in the lower part thereof;
- tough backdrop, from the inside to the extended fingers;
- insole - pronator.

Stabilizing orthopedic shoes

Figure 11 - Footwear equine-vargusnoy and equine-varus foot abnormalities

It is used in equine-vargusnoy and equine-varus foot abnormalities characteristic of cerebral palsy. Footwear develops movement skills, forming the correct gait and preventing further deformation. Distinctive features of the model are:

- high heel mid-calf;
- Berecz sided rigid type;
- insole, arch support;
- the locking element at the bottom.

Therapeutic and prophylactic, maloslozhnaya orthopedic footwear performs diagnostic, preventive and curative functions. In the process of wearing such shoes can independently verify the presence or absence of defects of the feet of the child by examining which areas subjected to abrasion on the sole. In the case of the proper development of the child's feet these shoes can be worn as a preventive for the proper formation of the joints of children's feet. In the case of detection of any deformation of the foot prevention shoes it is recommended to wear at all times with the use of orthopedic insoles. The main task of this shoe is to prevent pathologies and correct formation of the arch. The most important advantage of this shoe is the presence of glued at the factory of orthopedic insoles -supinatora, the purpose of which - the prevention of flat feet and the relief of pain when walking [12].

Only natural high-quality materials used in the manufacture of footwear: leather and nubuck, allowing the foot to "breathe". The models are characterized by having a high hard backdrop. The design of the fasteners allows to fix the child's foot in the correct position. There is an optimal heel, flexible non-slip sole. With this shoe provides the proper development of the baby's legs both as a prophylactic shoe, and as a therapeutic shoe. Specialists (orthopedists, pediatricians, neurologists) note the practicality and comfort of this shoe, its compliance with modern requirements that apply to children's shoes. Caring parents bought a beautiful, expensive shoes, which, unfortunately, in the best case, the child does not fit, and often harms the child's legs.

Additionally affects hard surface (asphalt, concrete, linoleum, laminate) that surrounds the baby in the city. Children with "problem" legs can not wear normal shoes factory production, even the one on which the manufacturer shall be marked «ortopedic». To solve this problem, the design of children's footwear developed for the prevention of a plano-valgus deformity. for baby shoes with flat-valgus feet should have a hard heel, well fixing the ankle using laces, straps or "sticky." Developed sketches of models of shoes for flat-valgus deformity of the foot (Figure).
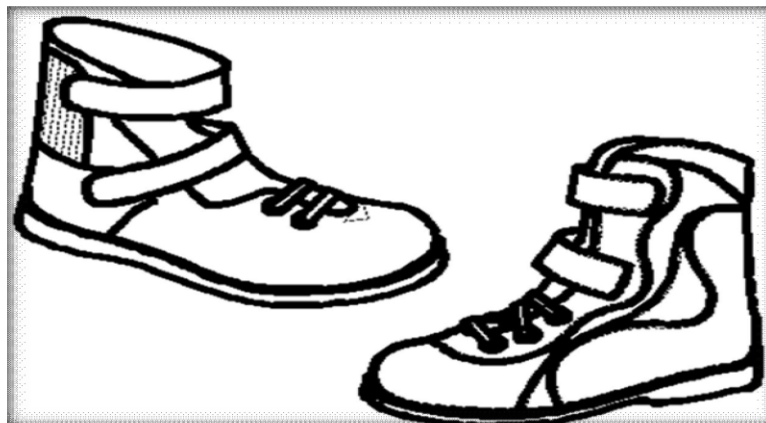

Figure 12 - Thumbnails models shoes for flat-valgus deformity of the foot

For fixing the ankle proposed construction of the shoe heel, in which a certain rigidity created by the process parameters, namely, the heel portion uses an additional assembly of the outer member, the intermediate member and the pad (Figure 13). The intermediate member of the batt which sew the workpiece upper parallel lines at a certain distance (Fig. 13). This creates the necessary rigidity of the heel part. [14]
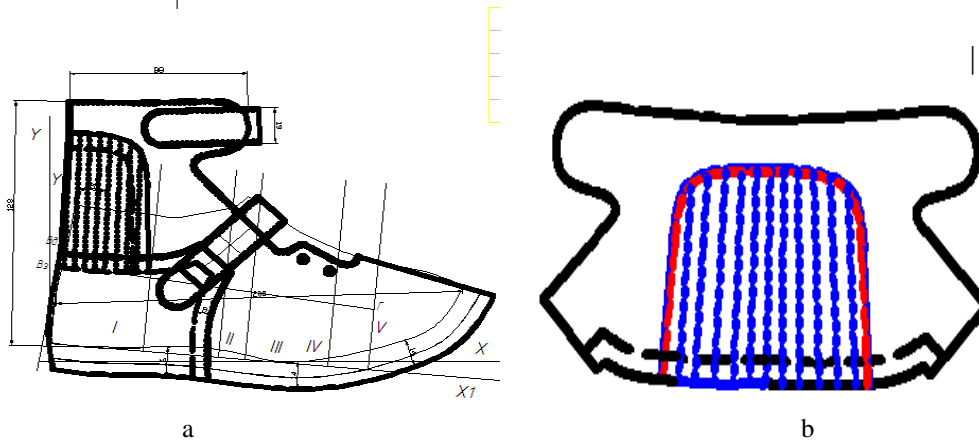

a   b

Figure 13 Design of details of top children's footwear prevention of foot flat-valgus a) Grund model uppers for the prophylaxis and b) the top node in the shoe heel portion

The developed designs uppers mated with anatomical arch support will provide the most effective exercise arch support and the correction angle of the inclination. This ensures proper development of the articular surfaces and further strain development is eliminated. SUMMARY developed by us supplementary insole structure is that it has a second intermediate layer, which is a flexible surface coated silica beads located above the elastic layer-prostilkoy throughout the insole surface. Removable insoles represents a multilayer structure in Figure 3, consisting of an upper layer 1 -2 additional intermediate layer of a flexible material, the surface of which is coated, of silica gel beads of different diameters in various sections, arranged over the intermediate layer of the elastic layer 3 -prostilki across supplementary insole surface and the lower layer 4. Rationale for the design of shoe uppers in accordance with the direction and the fashion footwear intended purpose. In the sketches of children's shoes for the prevention of a plano-valgus foot developed a model based on a single imaginative solutions, style and material properties. In the first stage we are invited to develop 4-5 models of a product in order to choose the optimum structural and color scheme of the basic model, in their design must take into account the construction of pads, the shape of the toe. The final decision on the choice of the base model was adopted after consultation (Table). At the same time carry out a comparative assessment models for manufacturability, unification, technical aesthetics. In developing designs leather products should be approached with the basic positions [15]:

- functional predetermines supplies;
- constructive (design-technological), reflecting efficient and economical use of the material);
- aesthetic. Pads Index 311 251 180 Size,

TABLE 3. Characteristics pads

Name Classification sign	setting value classification attribute
1. Sex and age group of pads	nursery
2. Subgroup pads (height of elation heel part)	10mm
3. The numbering system	metric
4. The initial number pad	180

5. Completeness pads	4
6. pads type	For closed shoes
7. design pads	Articulated
8. Non blocks in the series	175-200
9. The number of required completeness, numbers fulness	3
10. The interval between adjacent Completeness circumference, mm	6
11. Blocks Index	311251

On the basis of the selected model developed preliminary list, where, along with the base model placed 4-5 models, which differ from the base by additional or modified components or accessories, construction fasteners, soles, heels, etc. In this case, the basic details have not changed since when cutting is necessary to keep the same cutter. Allowed to change one or two details. In the text it is necessary to refer to the number assigned to a number of standardized models, indicating these numbers. Give a detailed description of all models of the unified series and their designs, distinctive features in the figures should reflect the type of materials used. It creates a unified series based on a single base shoe; for leather goods - two unified series. When choosing materials on the top and bottom parts of shoes should proceed from the kind and type of shoe, its purpose are the requirements to details, the fashion trends. All parts uppers (one pair) is generally used material of one kind only sometimes combine two types of material. When using a skin difference in requirements details uppers considered selection of its thickness, density and ductility. Thus, the most critical parts (vamp) Cheprak cut out from the skin, and a secondary part (tongue) - pripolnyhuchastov of which are more malleable and have a smaller thickness. Vamp toe part is the foremost part of the shoe, so the material for this part make high aesthetic requirements: it must be resistant to cracking, abrasion, contamination, its surface should be easily cleaned from contaminants. The materials for the uppers impose more stringent than for other items, technology and consumers' requirements, as vamp operates in more complex field of force as in the manufacture of footwear, and in its operation. It is in this zone the largest preform extractor shoe upper during molding and maximum flexing when worn [16]. From the viewpoint of hygiene material for shoe upper should provide normal microclimate vnutriobuvnogo space, t. E. Be waterproof the front side, a heat-resistant, have a low thermal conductivity, be permeable, hygroscopic, resistant to perspiration action, have high rates of water absorption and vla- gootdachi . The material for shoe uppers, must not allocate or release in the minimal amount of a substance that can cause diseases of the skin and other organs of the foot. According to GOST 26165-04 "SHOES CHILDREN" on top of the outer parts can be applied on chrome-tanned leather GOST 939-88. Shoe uppers are divided into two main groups: leather uppers and linings preferably lame tanning method for everyday shoes. A special subgroup of suede - leather fat and fat-formaldehyde tanning; Leather for shoe uppers and linings are divided by type of raw material from which they have been made, the configuration and the method of tanning method and character decoration. Furthermore skin divided area, thickness, and depending on the quality grade. Government standards provide the following types of finishing the front surface of the leather: smooth skin with natural unground with podshlifovannoy and polished front surface; leather with an embossed front surface; skin with a threaded outer surface; patent leather and "crumpled" skin. Skin produce the following types of coating the front surface; casein, casein-emulsion, the emulsion, nitroemulsionnoe. According to type of the type of raw chrome leather divided into calf, vyrostok, polukozhnik, Rawhide, Rawhide, Bychin etc. Comparison of key physical and mechanical characteristics of the three views materials given in Table 4 [17].

Table 4 Comparison of Indicators of materials for physical and mechanical properties

number p / p	Name indicators	U measure	. Value indicators GOST or TU		
			Chromium. Rawhide	Chromium. polukozh	Chromium. vyrostok
1	2	3	4	5	6
1.	Tensile strength at stretching (Mean of the longitudinal and transverse specimens)	Kgf / mm^2	21/18	21/19	26 / 23.5
2.	Elongation at a load 1kgs / mm^2	%	18-30	18-30	15-25
3.	Voltage at appearance cracks facing layer (average value)	Kgf / mm^2	17	18.5	21-15
4.	stability coverage to flexing	bend Men do not	1500	1500	1500
5.	The thickness of the skin in the standard point	mm	0.9-1.2	0.9-1.2	0.8-1.1
6.	Content matter leachable organic solvents	%	3,8-8,8	3,8-8,8	3,8-8,8
7.	The content of chromium oxide	%	4.3	4.3	4.3
8.	The moisture content of not less than	%	10-16	10-16	10-16
9.	The average area of the skin	dm^2	240	195	75
10.	Namokaemost	%	18	16	16
eleven.	breathability	cm^3/from	60-80	60-80	50-75
12.	water vapor permeability	%	49	40-65	40-65
thirteen.	The average weight of the skins	kg	21	eleven	6.5

Based on data in Table. it can be concluded that the choice of the outer parts chrome top rawhide cost of the set-top shoes will be the smallest that has a significant impact on the cost of the shoe as a whole. But for aesthetic reasons at the top of the outer parts chrome vyrostok selected. When choosing materials recommended wider use of new materials that replace natural skin, guided by the requirements of GOST or TP for finished products.

Description of the appearance of the product

1. Shine Profession: preschool

2. Type of footwear: boots

3. Style pads: 311 212.................................

4. The method of fixing: adhesive

5. Upper Material: chrome leather vyrostok

6. The bottom Material: porous rubber

7. guests at the Footwear: GOST 26165-04 "Children footwear"

8. The preform Structure: gated shoes with b / t velcro strap, leather edging zadinkoy and details zadinki. As used decoration combining tsvetovoygammy

Figure 13. Children's shoes for the prevention of flat-valgus feet

TABLE 5. Model passport

number	Name parts	Number on pair	Name material	Thickness parts	Standard on material
1	2	3	4	5	6
1	vamp	2	Chromic vyrostok	1.1-1.3	939-88
2	Berecz	2	cloth jeans	1.1-1.3	19196-84
3	backdrop	4	cloth jeans	1.1-1.3	19196-84
4	The upper part backs	2	Chromic vyrostok	1.1-1.2	939-88
5	CHPR	2	Chromic vyrostok	1.1-1.2	939-88
6	detail CHPR	2	Chromic vyrostok	1.1-1.2	939-88
7	detail backs	2	Chromic vyrostok	1,9-1,0	939-88
8	lining under vamp	2	lining leather sheepskin	0.9-1.1	940-81
9	lining under Berecz	2	lining leather sheepskin	0.9-1.1	940-81
10	lining under CHPR	2	lining leather sheepskin	0.9-1.1	940-81
eleven	shock absorber backs	2	foam rubber	10	NTD
12	Mezhpodkladka under vamp	2	Termobaz	+	TU

Clarivate Analytics *indexed*

thirteen	Mezhpodkladka under tailpiece	4	Termobaz	+	TU
14	toe	2	Thermoplastic material for the the toe cap	1.1-1.5	TU 17 21-597-83
fifteen	backdrop	2	Thermoplastic	+	TU 17 24-84
16	removable insoles preventive	2	lining leather sheepskin waste + PU	+1.8	19196-84
17	Soft heel cushions	2	foam rubber	+	BAT
18	insole	2	Kozhkarton	2.3-2.4	9245-84
19	Postilka	2	Batting	+	BAT
20	Heel	2	Moss rubber	20	12365-84
21	Sole	2	Moss rubber	8-10	12365-84

Description of the appearance of the product
1. Shine Profession: preschool
2. Type of footwear: boots
3. Style pads: 311 212.................................
4. The method of fixing: adhesive
5. Upper Material: chrome leather vyrostok
6. The bottom Material: PVC

7. guests at the Footwear: GOST 26165-04 "Children footwear"

8. The preform design: Open-type boots composed of vamp parts vamp, tibia, ZNR, soft edge bertsevi, b / t of the belt on the buckle, as the decoration applied combination of colors, decorative seams and perforations on the vamp

Figure 14 - Children's shoes for the prevention of flat-valgus feet with leather backdrop

TABLE 6. Model passport

number	Name parts	quantitative in Napara	Name material	Thickness parts	Standard on material
1	2	3	4	5	6
1	vamp	2	chrome vyrostok	1.1-1.3	939-88
2	detail vamp	2	cloth jeans	1.1-1.3	19196-84
3	Berecz	4	cloth jeans	1.1-1.3	19196-84
4	The upper part tibia	2	chrome vyrostok	1.1-1.2	939-88
5	CHPR	2	chrome vyrostok	1.1-1.2	939-88
6	ZNR	2	chrome vyrostok	1.1-1.2	939-88
7	detail backs	2	chrome vyrostok	1,9-1,0	939-88
8	lining under vamp	2	lining leather sheepskin	0.9-1.1	940-81
9	lining under Berecz	2	lining leather sheepskin	0.9-1.1	940-81
10	lining under CHPR	2	lining leather sheepskin	0.9-1.1	940-81
eleven	shock absorber backs	2	foam rubber	10	NTD
14	toe	2	thermoplastic material for the toe cap	1.1-1.5	TU 17 21-597-83
fifteen	backdrop	2	Thermoplastic	+	TU 17 24-84
16	removable insoles preventive	2	lining leather sheepskin + PU waste	+1.8	19196-84
17	Soft heel cushions	2	foam rubber	+	BAT
18	insole	2	Kozhkarton	2.3-2.4	9245-84
19	Postilka	2	Batting	+	BAT
20	Sole	2	Rubber	8-10	12365-84

Conclusion

Based on research to determine consumer preferences found that the currently implemented baby shoes with prophylactic properties has some drawbacks regarding both materials and design, and external signs. Consumers experience an obvious flaw in the children's prophylactic footwear domestic production. Based on analysis of the design features prophylactic shoes installed main structural features of the shoe to the foot resheniyavoprosa dense fixation of the child and to provide the necessary stiffness heel part of the shoe upper structure designed fixing the ankle joint using laces, straps or "Velcro". For fixing the ankle proposed design heel of the shoe, in which a certain rigidity created by the process parameters,

namely, the heel portion uses an additional assembly of the outer member, the intermediate member and the lining, developed constructions uppers mated with anatomical arch support provides implement maximum effective support for the arch stopyi correction angle of inclination [18-19].

It is shown that anthropometric study and stop the development of science-based requirements for the design of footwear for children and teenagers is a topical issue for the footwear industry. It was determined that the main factor in the formation of the requirements for shoes for children's shoes should be the preservation of health, as this age is vulnerable to environmental action. The place of the shoe in combination of health factors. It was found that the shoe has an impact on all categories of health: somatic, personal and social. Thus, the use of standard mass produced shoe means orthopedic technology as supplementary insoles and other supplementary devices can serve as an effective means to improve its preventive properties including for flat - valgus foot. To do this, specialists in the design and manufacture of footwear of mass production should timely receive current information about the new designs of these orthopedic appliances, as well as the indications for their use.

Parents of children with abnormalities, including with flat feet, experiencing an obvious flaw in the children's prophylactic footwear domestic production. established its basic design features based on analyzing preventive footwear. Shoes with prophylactic properties of a certain segment of the consumer market of Child and Adolescent shoes. It is distinguished by the presence of design solutions, providing maximum comfort to wear, the presence of special parts (ins anatomical insoles, polustelki, calculations and other flavoring components), a rational evidence-based internal form of footwear and application of high-tech materials in the manufacture of shoes, their tough selection for physical and mechanical and hygienic parameters. On preventive footwear experimenting with new designs and materials to ensure maximum comfort to the child, and the creation of necessary conditions for it to prevent disease and foot deformities.

The developed designs uppers with anatomical arch support provide the most effective support arch and correction of the angle of her naklona.Takim, it is important to have a permanent union between a doctor - orthopedist and manufacturers corrective detalny to garanitrovat stop child comfort and high confidence to him and his parents on the prevention education at their child patolgicheskih deviations.

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SOCIO-POLITICAL APPROACHES TO GENDER ISSUES

Abstract: The article considers gender in the political life of the state and society. Initially, the term "gender", its origin and description of gender and gender concepts are presented and analyzed by Western scholars who studied gender relations in their studies. With the help of data and statistical examples, the importance of gender policy in solving the political problems of public authorities in the political activities of women, which are becoming increasingly important in the modern world. International reforms in gender policy are focused on gender policy in Uzbekistan. Conclusions and suggestions are made about the need to ensure gender equality while expanding the political participation of women in public administration.

Key words: gender, politics, sex, gender politics, gender equality, gender inequality, social gender, gender studies, gender role, socialization, gender identity, gender relations, political factors, gender symmetry, gender stratification, gender identity, gender identity, expressive role, instrumental role, feminism, etc.

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Scopus ASCC: 3318.

Introduction

The term "gender" is a relatively new concept in science. Since today this term is widely used in a number of areas, it is important to study the origin and use of this term. Gender relations are widely studied as objects of research in the social and human sciences. In particular, anthropology, psychology, sociology, philology, philosophy, political science, history, economics to some extent study gender issues. Scientific views on the social status and gender relations of men and women can be seen in the studies of Western scholars such as Durkheim, Talcott Parsons, Habermas, Bourdieu, Simmel, Giddens, Luhmann, Hoffmann and Garfinkel. Emile Durkheim linked sexual relations with the development of the social division of labor and civilization.

He explains[1] that as a result of social development, one of the sexes is emotional, and the other performs intellectual functions and complements each other. This distribution will continue in family, daily life, social, professional and other social relationships. An accurate understanding of gender roles is complemented by scientific theories.

Talkott Parsons and Bales views on the sociological interpretation of gender relations are important. They promote the idea[2] that women are expressive in the social system, and that men play an important role. The expression of the expressive role of women is the balance of psychological and emotional balance in the family.

The instrumental role of men is to regulate relations between the family and other social groups, to support and provide for the family. They form the basis of a traditional family.

The struggle of men and women for equal rights, freedoms and opportunities has passed a long

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[1] Durkheim, E. On the division of social labor. The method of sociology. M.: Nauka, 1991.S. 61.

[2] Zdravomyslova E.A., Tyomkina A.A. Sociology of gender relations and gender approach in sociology © 2000. p.16 Microsoft Word - 002.ZDRAVOMYSLOVA.doc [Date of access 13.02.2020]

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historical period. The practical steps that began at that time were taken to a new level by the introduction of the term "*gender*" in 1968 by the American psychologist Robert Stoller. The term "gender" can be understood as the process of socialization of an individual.

Stoller notes[3] that the term "gender" is a concept that has psychological and cultural characteristics, not biological ones. If you correctly define gender as male and female, then respectively gender can be defined as masculinity and femininity (masculinity and femininity). American psychologist John William Mann (1921-2006) suggests that gender arises in the process of learning the native language. This is approximately until the child is 18 months old.

Gender is defined as a system of behavior and characteristics of men and women, their way of life and thinking, their role and relationships as individuals in the process of socialization, formed by society and social institutions. The gender system is defined from the social, political, economic and social points of view.

It is necessary to distinguish between the concepts of "gender" and "sex". If the biological sex is given to a person from birth, then gender is formed in social relations and is determined by the culture of society in a certain historical period.

Gender is a social sex that forms behavioral, cultural, psychological, and other sociocultural differences between men and women.[4] Gender is a complex concept, in its scientific explanation, we refer to the following comments:

• Anthropologists (for example, Margaret Mead), psychologists (Stoller, Z. Freud.S, J.Mann, Hampshire) and sociologists (Durkheim, Parsons) analyze the sex ratio not biological, but social, cultural, and historical. Importance is given to social factors, not to the category, race, age, origin, gender, or sex of the individual[5]. In General, it should be noted that the analysis of gender relations is essentially an analysis of gender relations in the economic, social, and political spheres of society.

• According to the radical feminist approach, one of the universal models of social stratification inherent in any society is the division into men and women depending on their gender.[6] In some cultures, biological differences between the sexes may be shown, while in others they may be reduced. This controversial issue, that is, gender inequality, causes constant debate and disagreement.

• According to Gidden's definition[7], it is necessary to clearly distinguish between sex and gender, since differences between men and women occur for unnatural biological reasons. If an individual's sex is determined biologically, then gender is determined culturally and socially. In other words, there are two types of gender (female and male), as well as gender roles such as femininity and masculinity. "Gender "is understood in different ways in Russian, and the term" gender" is used to avoid discrepancies in the definition of socio-cultural characteristics of a person.

• The state of self-awareness associated with definitions of masculinity and femininity in different cultures is called *gender identity* or *self-awareness*. Gender identity is an understanding of one's own attachment to men and women who practice in a particular culture. In other words, it means that this society accepts a model of psychological qualities and actions that are determined by their biological origin[8]. The main thing in this is how a person characterizes himself, his position in society.

• Gender inequality is a characteristic feature of the social structure, according to which there are constant differences between different social groups (including men and women) in society, as well as unequal opportunities. This expression appeared in 1980 as the basis of the feminist concept (according to John Scott). In other words, gender inequality is that women and men have unequal rights, resources, and powers. Although the roles played by women and men differ significantly in different cultures, a society in which women have more power than men does not yet exist. The main task facing a woman, in whatever society she may be, is the upbringing of children and the management of the household, political and military actions is largely considered as the right of the male sex.

• Based on traditional views of the roles of men and women, it follows that their social actions are based on biological differences. On this occasion, the famous psychoanalyst Sigmund Freud, who lived in the early XX century, said that, "Anatomy - is fate". According to him, the upbringing of a son is traditionally aggressive, because a man must be strong, ambitious and persistent in relation to a woman. For men are given the role of creators of history and culture. Girls from an early age are imbued with the role of a future mother, she should not have personal interests, she should devote her life to her

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[8] Glossary https://gender.uz/ru/site/glossary [accessed 12.02.2020]

family, her husband and children. Girls are raised both physically and psychologically defenseless. This creates a favorable basis for accepting violence against women.[9] Proponents of gender equality argue that the traditional granting of biological roles to both men and women is the result of a certain socialization, education, public opinion, literature and art, advertising, media and television. Therefore, advocates of gender equality fight for the elimination of traditional stereotypes, for understanding the individuality of each gender, and for equal opportunities.

• Gender asymmetry in the political sphere (an imbalance in the number of women and men in the political decision-making process) is clearly visible, because women's participation in the political life of society is low. According to world statistics, women account for 10 per cent of seats in parliaments and 6 per cent in national authorities.[10] However, women make up more than half of the population. Women's

employment in the family, lack of funds or support for conducting election campaigns, lack of foresight of big goals in achieving high positions, and achievement of political goals can be cited as reasons for the unequal position of women in politics with men. It is also natural that women's leadership in politics is difficult to study, since society has difficulty rejecting existing gender stereotypes.

By the middle of the XX century, special attention was paid to the problem of gender in the world. This term, which has been widely used since the 80s of the last century, reflects the exploits of women and men, their gender characteristics, lifestyle, thoughts and aspirations. A number of reforms have been carried out in the world to increase the role of women in the life of the state and society, and their socio-political activity.

In particular, granting women the right to vote in elections on an equal basis with men is an important step in recognizing women's rights and freedoms on a global scale. We will see this in the table below:

Table 1. Year and countries women are given the right to vote on an equal basis with men. [11]

1893	New Zealand	1945	France, Hungary, Italy, Japan, Vietnam, Yugoslavia, Bolivia
1902	Australia	1946	Albania, Romania, Panama
1906	Finland	1947	Argentina, Venezuela
1913	Finland	1948	Israel, Korea
1915	Denmark, Greenland	1949	China, Chile
1917	Central Asian countries	1950	El Salvador, Ghana, India
1918	Canada	1951	Nepal
1919	Austria, Germany, Netherlands, Poland, Sweden, Luxembourg, Czechoslovakia	1952	Greece
1920	The USA	1953	Mexico
1922	Irish	1954	Colombia
1928	Britain	1955	Nicaragua
1929	Ecuador	1956	Egypt , Pakistan, Senegal
1930	South Africa	1957	Lebanon
1931	Spain, Sri Lanka, Portugal	1959	Morocco
1932	Thailand	1962	Algeria
1934	Brazil, Cuba	1963	Iran, Kenya, Libya
1936	Costarica	1964	Sudan, Zambiya
1937	Philippines	1965	Afghanistan , Guatemala
1941	Indonesia	1977	Nigeria
1942	Dominican Republic of Uruguay	1979	Peru, Zimbabwe

Traditional political science and law previously considered women only as objects. In other words, philosophers, politicians, theorists, and practitioners of politics have ruled out that women participate in the political process, and this is not typical of women's

nature. The liberal theory of human rights was created in practice as a theory of human rights. This situation was sharply criticized by feminists. At this time, they began to create their own concepts of politics, political participation, and women's human rights theories. The

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[9] Svetlana A. " Gender equality in the context of human rights" http://www.owl.ru/win/books/gender/2.htm [accessed 13.02.2020]

[10] Introduction to the theory and practice of Gender relations package T.: 2007, 43-b. n_uzb_gender_book_uzb.pdf
[11] Tuttle L. Encyclopedia of Feminism. 1986. P. 370-1

activation of feminist movements and the popularization of the ideas of democracy and human rights in public thinking have led to a change in the situation in political theory and practice. Feminism has seriously analyzed many important concepts that apply to political science, including such concepts as power, sovereign powers, political obligations, civil, private life, democracy, and justice. Women's rights have become an integral part of international instruments and international practice in the area of human rights.

In recent years, local gender research experts have been working on many different topics. Among them, the study of gender aspects of policy plays an important role. In particular, the concepts of gender equality, gender inequality, gender symmetry and gender asymmetry are widely used in the study of political processes.

In the last quarter of the former century, British and American politics have identified issues of women's political activities in a separate area of studying and have found a solution in the form of the Association of researchers dealing with the topic "women and politics". The study of topics such as" women and politics"," women and democracy"," women and political participation"," women and power"," women and political theory", and" women and social behavior" began. In the 80's, a comparative analysis of the political activity of women and girls was formed. In the late 80's, studies were published on the end of the social policy of individual countries, on some issues of the Western women's movement and political theory. V.Fesenko notes in his research that when studying the issue of "women and politics", a number of problems may arise, that is, the inability of women to be the subject of political relations, their participation and role in society are considered from a narrowly functional point of view, and they are not allowed to possess the qualities inherent in women[12]. According to the results of the study, the increase in women's political activity is due to an increase in their level of knowledge, an increase in the number of working women, and a reduction in the time they spend caring for children.

The work of the United Nations for the protection of women's rights begins with the publication of its Charter. Among the goals set out in article № 1 of the Charter, it is proposed to "implement international cooperation in the field of respect for and development of human rights and freedoms regardless of race, gender, language and religion"[13]. In the first year of activities of the United Nations Commission to study the status of women,

namely the economic and Social Council established the Council, which became the global governing body dedicated to gender equality and support women. One of the most important tasks of the Commission is to monitor the observance of gender equality on the basis of the draft Declaration of human rights.

In the 70s of the XX century, when feminist movements began to expand internationally, the UN General Assembly declared 1975 the International women's year and dedicated its first world conference in Mexico city to this topic. As a result of the strict recommendations of the organizers, the years 1976-1985 were declared the UN decade of women and a voluntary Fund was established for this period. In 1979, the General Assembly adopted the Convention on the elimination of all forms of discrimination against women (CEDAW), which Five years after the Mexican conference, the second world conference on women was organized. In 1985, the world conference "UN decade of women: a review and appraisal of the achievements of equality, development and peace"was held in Nairobi. was called the International bill of rights of women. Five years after the Mexican conference, the second world conference on women was organized. In 1985, the world conference "UN decade of women: a review and appraisal of the achievements of equality, development and peace"was held in Nairobi. This event was organized at a time when the movement for gender equality has reached a global level on a global scale. The forum was attended by representatives of 15, 000 non-governmental organizations (NGOs). This event has been called the "birth of global feminism". Gender inequality still persists in the economic and political spheres. According to the UN, despite some progress made in recent decades, women on the global labor market find work on average 24 percent less often than men. As of August 2018, the total number of women parliamentarians is at least 24%.In 1995, this figure was 11.3 per cent, as evidenced by the unsatisfactory pace of positive changes in this issue.[14]

In the 1990s, proposals from UN member States to create an international organization that deals directly with gender issues began to fall. In 1994, more than 10,000 delegates from 179 countries participated in the international ethics conference in Cairo, supporting the UN proposal to create a framework for gender equality and women's empowerment. The UN organization for gender equality and empowerment of women, which has been operating since then, will closely assist UN member states in the development and implementation of

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[12] Fesenko V. " Dynamics of women's political participation: self-organization, political movement, entry into power (1989-1998)//Femina postsovietica. Ukrainian woman in the period of transition: from social movements to politics / ed. by I. Zherebkina. Kharkiv: KCGS, 1999, p. 83-151.

[13] Chapter I / United Nations https://www.un.org/en/sections/un-charter/chapter-i/index.html [accessed 18.02.2020]

[14] United Nations. Gender equality file:///C:/Users/fpb/Desktop/Gender [accessed 4.02.2020]

relevant laws and programmes for the implementation of international instruments on the establishment of gender equality.

This is another step after the Nairobi conference of the fourth World Conference on women in Beijing in 1995. The Beijing Declaration and its platform of action affirm their commitment to a concrete action to ensure respect for women's rights.

The Commission on the status of women is the main governmental body at the global level that deals exclusively with gender equality and women's rights and opportunities. The Commission on the status of women plays an important role in protecting women's rights, determining the status of women in all countries of the world, and defining global laws on gender equality and women's empowerment. The documents of the fourth world conference of women (Beijing, 1995) introduce the term "gender integration" as a political strategy. According to him, without the active participation of women at all levels of the decision-making process and without taking into account the interests of women, it is impossible to achieve the goals of equality, progress and peace.[15]

On July 2, 2010, delegates of the UN General Assembly voted to create a single organization responsible for accelerating progress in achieving UN goals related to gender equality and empowerment of women.

The United Nations organization for gender equality and the empowerment of women (UN WOMEN) brings together four divisions of the world organization: UN Women's development jargon (UNIFEM), the women's development division (CEDAW), the special adviser for the advancement of women, and the United Nations international research and training Institute for women's development (INTRAW).

Meanwhile, all UN efforts are aimed at achieving the sustainable development Goals (sdgs). In order for women's rights to be respected worldwide, many States must make appropriate changes to their national laws. The light of light initiative, implemented in partnership with the European Union, was created to end violence against women and ensure gender equality.

The UN "*Spotlight*" initiative is a global multi-year partnership between the European Union and the United Nations to eliminate all forms of violence against women and girls by 2030. Women and girls make up half of the world's population, which is said to equal half of the capabilities of humanity. The European Union and the United Nations have established a partnership to eliminate all forms of violence against women and girls, this Alliance will be funded from an initial financial package of 500

million euros, this initiative will ensure the creation of new multilateral partnerships and broad coverage and targeted support[16]. It encourages the highest political commitments and contributes to the achievement of sustainable development goals (in particular, gender equality). This initiative aims to eliminate domestic, sexual and gender-based violence, harmful customs, human trafficking, and economic exploitation.

Violence against women and girls is one of the most frequent and widespread human rights violations. According to the UN, today more than 700 million girls living around the world are transferred to marriage before the age of majority, about a third of them that is about 250 million people, were under the age of 15 at the time of marriage. Almost 70 per cent of all victims of Since the Foundation was established, they have received grants totaling $ 426 million for 116 initiatives in 136 countries. Among the many activities of the programme, the Secretary-General's programme "Elimination of violence against women" proposed the inclusion of an Orange Day on the 25th day of each month was declared a day dedicated to violence against women. November 25 is marked as the international day for the elimination of violence against women. And March 8 was declared International Women's Day. On this day, women around the world celebrate their achievements regardless of national borders, ethnic, linguistic, racial, cultural, economic and political differences trafficking found worldwide are women and girls.

As an equal subject of international law and human relations, many decrees and decisions on gender equality are adopted and implemented in our country at the state level. As a result of consistently implemented large-scale reforms, economic stability is ensured. At the same time, within the framework of the fifth sustainable development goal, Uzbekistan has developed a set of tasks related to "ensuring gender equality and empowering all women and girls".

According to the fifth goal (gender equality), it is necessary to eliminate any form of discrimination against all women by 2030, to ensure equal opportunities for full and effective participation and leadership of women at all levels of decision-making in political, economic and social life. In addition, this goal includes the introduction of gender equality principles in the process of adopting state programs at various levels of the state.

In recent years, efforts to ensure gender equality and increase the role of women in public and political life have been carried out in several areas:

- improving the legislation on women's rights;
- improving the institutional framework for women's protection ;

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[15] Aivazova S. G. Gender equality in the context of human rights. Moscow, 2001. P. 76

[16] The Spotlight Initiative to eliminate violence against women and girls https://www.un.org/en/spotlight-initiative/index.shtml

- raising public awareness of gender equality and women's rights ;

- training of officials responsible for ensuring their compliance in law enforcement practice on the basis of relevant legal norms.

If we talk about institutional measures to ensure gender equality in our country, at the same time, a new issue of equality of women and men was created in the Senate of the Oliy Majlis of the Republic of Uzbekistan, which is engaged in harmonizing international standards in national legislation to ensure women's rights and eliminate any forms of discrimination. All these newly created institutional bodies, together with the women's party of Uzbekistan, in accordance with the UN Convention on women's rights, gender equality and the unified integrity of the elimination of discrimination against women, are an important aspect of this issue.

It should be noted that the adopted legal documents and practical measures are an important step in the field of gender policy in Uzbekistan and fully comply with international norms and standards of legislation and practice, while some of them are based on the recommendations of UN human rights bodies. With regard to legislative measures in this area, in order to further improve the legal framework for ensuring and protecting women's rights in Uzbekistan, the laws "on guarantees of equal rights and opportunities for women and men"and "on protection of women and girls from harassment and violence"were adopted in September 2019.

At the same time, within the framework of cooperation between UN agencies, a special group on gender issues has been established in Uzbekistan, which includes representatives of almost all UN agencies. In turn, the UN team in Uzbekistan will continue to provide comprehensive assistance to the country in order to ensure gender equality within the framework of the partnership for Sustainable Development for 2021-2025, which is currently being developed on the basis of broad consultations of all national partners and other stakeholders. On November 28, 2019, Tashkent hosted an international forum on the theme "Development of cooperation on gender and youth issues in the XXI century", organized by the Commission on gender equality of the Republic of Uzbekistan together with a number of international organizations. Also on 16 and 17 February of this year Dubai hosted the Women's Forum Bulungan. Saida Mirziyoyeva, a member of the Commission on gender equality of Uzbekistan, also took part in the forum and made a report on the reforms carried out to ensure gender equality in our country.

In conclusion, in an economically stable society, equality between men and women is at a high level. Gender equality also means social equality. To ensure such equality, it is not enough to introduce the necessary norms in the Constitution and laws. To ensure gender equality, women and men must have equal access to legal information resources and opportunities to participate in the management of the state and society. This means that gender equality implies equal conditions for men and women to exercise their rights as a contribution to the National, political, economic, social and cultural development of the country, as well as equal opportunities to enjoy the results of their activities.

World experience shows that the solution of many problems in the field of women's rights is largely due to the culture of equality of men and women in society, in many respects gender policy. What you need to pay attention to in the main part of the Bund:

First, it can't be achieved without educating a woman to have a respectful relationship as a person, without raising her status, without improving her position in the family and society, without strengthening her legal status. For this reason, the importance of creating a clear legal framework for the protection and enforcement of women's rights, a favorable social environment for women, strengthening their status in the family and society, and increasing participation in state power structures is increasing.

Secondly, in the National mechanism for implementing international human rights standards, the importance of coordinated work in various levels, the activities of women's and women's public associations to protect the rights of men and women is increasing. However, the level of women's participation in politics, especially in the higher echelons of power, remains low, despite the fact that it has increased compared to previous elections. There are still no women leaders in political parties. Training women for leadership, communication skills with a large number of people, and responsible decision-making is undoubtedly an important task.

Without changes in this area, we cannot expect the development of civil society, the strengthening of its democratic institutions, the development of a strong, independent private sector, as well as various public and women's organizations. Its activities are aimed at the democratization of society (including through gender equality), and decision-making and the development of political parties is a requirement of time.

Third, it is necessary to further promote the development of the legal and political culture necessary for women and men to achieve consensus between men and women in the gender dimension of law, especially in the area of fundamental human rights, and to bring this consensus to real action towards gender equality and positive social development. The strategy for effective use of legal and political processes by women was to change the negative attitude of society towards women, overcome obstacles to improving their social and

family status, and respect their rights due to gender inequality.

It should aim to put an end to discrimination and violence against retiring women. It is difficult to implement a restructuring of public relations based on the idea of democratization of society, the superiority of men, without changing the traditional thinking, Patriarchal stereotypes about the role of women and men, their rights and responsibilities. The preservation of Patriarchal values, gender differences, and a civil, open society will undoubtedly stop the progressive movement.

Fifthly, women should become more and more influential in political parties, in business, that is, where they will have real means of power to expand the network of supporters of equality policies. The increase in the number of women in various authorities can be achieved much more intensively when implementing gender equality policies.

The protection of women's rights in conditions of independence is an important area of state policy. Uzbekistan supports all UN initiatives aimed at ensuring the rights and interests of women. Measures are constantly being taken to develop and implement legal guarantees for the equality of the social status (status) of men and women in the country. The activities of women's public organizations (NGOs) are aimed at creating a mentality that can change traditional social norms, mores, norms and gender stereotypes that are ingrained in the minds of the masses, to put in place a system of certain restrictions, and normalize the development of creative potential.

The perceptions that women's status in public opinion is low relative to men remain, and the need to take timely measures to correct this situation remains an urgent problem. New social conditions contribute to the emergence of new goals, the elimination of women's distance from politics and power, and the elimination of gender discrimination in all spheres of life.

In conclusion, I would like to say that, as the feminist theorists pointed out, being a man or a woman means not having certain natural qualities, but performing certain sociological tasks. This will have a direct and indirect impact on the factors of socialization, first of all, on the person himself, then on the environment, family, community, state and society, and will lead to the development and improvement of the individual. As the French philosopher Simone de Beauvoir said: "One is not born, but rather becomes, a woman."[17]

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PEDAGOGICAL POTENTIAL OF THE FOREIGN LANGUAGE DISCIPLINE IN HIGHER EDUCATION FOR DEVELOPING SOFT SKILLS OF STUDENTS

Abstract: *The article focuses on the problem of soft skill development in higher education discussing the reasons that engendered the need for social skills in modern workplace. In order to prepare professionals that can meet the demands of modern marketplace the author explores the pedagogic potential of the "Foreign language" as a separate discipline.*

Key words: *social competence, soft skills, professional skills, teaching foreign languages, higher education, pedagogic potential.*

Language: *English*

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Introduction

The development of modern society in dynamic pace, changes in world education characterized by the tendency to create a unified educational space, the change of generations, and along with the needs of the subjects of education, has served as an impetus to the reform of higher education system in the Republic of Uzbekistan. Changes are being reflected in new laws of the country concerned on educational system. Including Uzbekistan's Development Strategy for 2017-2021 implies the development and implementation of modern teaching methodologies in general educational institutions to improve radically the quality of education. This direction is very comprehensive and introduces the new state standards of education on the basis of consistency, continuity and competence approach. It should be noted that at present, in higher education system it is being planned to develop a new generation of textbooks and teaching materials to improve the teaching of general subjects and to improve state educational standards. As a part of this process, a point-rating system for assessing the quality of education is being implemented, modules of the main educational programs are being developed, and the competency-based teaching model is used as

the methodological basis for the content of modern higher education. These changes are designed to improve the quality of higher professional education and, as a consequence, the competitiveness of graduates of Uzbek higher education in the world labor market.

Recent international studies show that possession of professional skills alone is no longer sufficient for employees in the highly competitive marketplace of the 21st century (Lazarus, 2013). The need for individual soft skills has taken on heightened importance (Seetha, 2014). The occurrence of the current need is explained in the following way:

- *Integration of modern communication technology into the workplace.* The new world is a place where technology is constantly improving and influencing change in the workplace (Connell, Gough, McDonnell, & Burgess, 2014). Specifically, this movement accelerates the displacement of workers by machines that can perform tasks faster, more accurately and 24/7. While technology enables business owners to reduce overhead by downsizing their workforce, individuals whose skill sets are now obsolete have limited options for employment if their current jobs are eliminated;

- *Increased cultural diversity within the workforce as a result of globalization.* Because of globalization process in the political, economic and social life all over the world, as well as the rapid development of international collaboration, participation in international and professional projects with foreign specialists the new world includes diverse work groups. Accordingly, members of these groups have to interact globally with different cultures. It made critical for employees to have interpersonal and intercultural communication skills to work with and understand team members.

- *Age diversity in the workplace.* Today's professionals are working longer than their predecessors. Studies show that the average workplace is now made up of four generations. There is a combination of individuals from multiple age groups including individuals near to retirement (Bailey, 2014). One of the main concerns for employers is that it's hard to manage a team that ranges from the ages of 16-60. Everyone is at such different stages in their life and career and this means they'll all have different wants and needs when it comes to work.

Generational changes have resulted in the increased demand for soft skills (Bailly, & Lene, 2013). As the main goal of higher education to prepare professionals that perform effectively in their workplaces it has to focus not only their academic skills but also, social competence that is often referred as soft skills. The most valuable employees in the organization have a mix of both hard and soft skill competence (Griffith & Hoppner, 2013).

It should be noted that foreign language courses owns a great potential in this respect. Many methodologists (Zimnyaya & Passov etc.) note educational potential of the discipline "|Foreign language". Discipline "Foreign Language", in our opinion, has sufficient pedagogical potential to form students' social skills. Below we are going to highlight three aspects in the potential of this discipline.

The potential of the course "Foreign Language" for the formation of students' social skills is, firstly, connected with the essence of the phenomenon of "language". As Makhkamova G. notes, "A foreign language is a socio-historical product, which reflects the history of the people, culture, the system of social relations, traditions". Without the use of language, it is impossible to achieve complete interpersonal interaction, and the process of learning languages, having a pronounced social context, is unique compared to the study of other disciplines.

Secondly, in our opinion, the potential of the discipline "Foreign Language" lies in the content of the language material. In the process of learning foreign languages, students should get acquainted with speech clichés (greetings, thanks, apologies, requests, requests, etc.) and their equivalents in a foreign language, knowledge of which is necessary

with interpersonal communication and without which it is impossible to be socially competent. In classes of a foreign language, students must be familiar with the formulas of social etiquette and norms of behavior in a variety of situations. By reading and listening dialogues, polylogues, texts, watching videos given in the national character, mentality of the target language students learn about how to behave with foreigners. Composing dialogues and polylogues on various topics, participating in role-playing games in a foreign language lesson, students model various life situations of interpersonal communication that require following certain norms of behavior (conversation of a boss with a subordinate, a parent with a child, a seller with a buyer, a waiter with a visitor, two colleagues in a formal setting, talking friends, etc.). The abstractness of the discipline "Foreign Language" allows a teacher to select educational texts on a wide variety of topics. So, in the process of studying the sections "My future profession", "Relationships" and others, reading and discussing literary texts in a foreign language about the various relationships between people and the conflicts that arise between them, serves as a positive or negative example of interpersonal communication, contributing to the formation of social competence.

Thirdly, the pedagogical potential of the course "Foreign Language" for the formation of students' soft skills lies in the possibility of using social forms of learning (working in micro groups, groups, collective forms of training). When applying collective and group forms of training (stage plays, role-playing games, group projects, brainstorming sessions, debates, discussions, trainings, etc.) there is an exchange of views in a foreign language, various positions are highlighted, and the potential and activity of each student and the entire group (class) is realized. Working in micro groups can be implemented in classes in a foreign language through the preparation of dialogues and collogues. In the preparation of dialogical statements, students are to take adequate actions when communicating with a speech partner: to speak logically, clearly express their thoughts. Through this they form skills of logical presentation of one's opinion, belief, perception of a different point of view, distinguishing between facts and opinions. Students learn to find the appropriate tone of communication with different interlocutors in different situations, develop a large repertoire of role-playing behavior (role plasticity), learn to analyze difficult situations that arise when people interact, understand the logic of their development, and distinguish the goals of participants in the communicative situation, predict the consequences of their behavior. When applying social forms of teaching in foreign language classes students make additions, corrections to each other's speeches, share experiences, identify a problem, find optimal solutions to it, which helps to shape the skills of constructive interaction, exchange of information,

self-regulation and self-control, forecasting and conflict resolution.

Thus, the pedagogical potential of the discipline "Foreign language" for the formation of students' soft skills is great and significantly superior comparing other disciplines. However, effective realization of this potential, in our opinion, can only be achieved if the teacher of a foreign language is purposefully prepared to form these competencies.

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BREAST CANCER PREVALENCE
(literature review)

Abstract: *The article provides an overview of the literature on the prevalence of breast cancer among women. Particular emphasis is placed on the frequency of occurrence depending on age, geographic location, and the main risk factors for breast cancer are presented.*
Key words: *breast cancer, prevalence, risk factors.*
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РАСПРОСТРАНЕННОСТЬ РАКА МОЛОЧНОЙ ЖЕЛЕЗЫ
(обзор литературы)

Аннотация: *В статье представлен обзор литературных данных по распространенности рака молочной железы среди женщин. Особый акцент сделан на частоту встречаемости в зависимости от возраста, геграфического расположения, а также представлены основные факторы риска рака молочной железы.*
Ключевые слова: *рак молочной железы, распространенность, факторы риска.*

Введение

Рак молочной железы является наиболее распространенным новообразованием, диагностируемым среди женщин во всем мире, а также основной причиной смерти от рака у лиц женского пола [1]. По оценкам, рак молочной железы поражает 2,1 миллион женщин каждый год, а также вызывает наибольшее количество связанных с раком смертей среди женщин. В 2018 году в мире было зарегистрировано более 2 миллионов новых случаев рака молочной железы, умерло 627 000 женщин - это примерно 15% всех случаев смерти от рака среди женщин (таблица 1) [2,3,4].

Таблица 1. Количество новых случаев и умерших по 10 самых распространенных видов злокачественных новообразований в 2018 г по данным GLOBOCAN 2018.

Локализация новообразований	количество новых случаев (%)	количество умерших (%)
Легкие	2,093,876 (11.6)	1,761,007 (18.4)
Молочная железа	2,088,849 (11.6)	626,679 (6.6)
Простата	1,276,106 (7.1)	358,989 (3.8)
Ободочная кишка	1,096,601 (6.1)	551,269 (5.8)
Немеланомный рак кожи	1,042,056 (5.8)	65,155 (0.7)
Желудок	1,033,701 (5.7)	782,685 (8.2)
Печень	841,080 (4.7)	781,631 (8.2)
Прямая кишка	704,376 (3.9)	310,394 (3.2)
Пищевод	572,034 (3.2)	508,585 (5.3)
Шейка матки	569,847 (3.2)	311,365 (3.3)

Заболеваемость раком молочной железы среди женщин в разных странах мира значительно варьирует, самая высокая отмечена в Соединенных Штатах и Северной Европе, средняя в Южной, Восточной Европе, Южной Америке, а самая низкая в странах Азии. В последние годы показатели заболеваемости в азиатских странах с низким уровнем заболеваемости имеют тенденцию к росту, особенно в Японии, Сингапуре и городских районах Китая, причиной которого считают переход к экономике западного типа и модели репродуктивного поведения [5,6].

Заболевание является наиболее часто диагностируемым раком в 154 странах из 185, а также является основной причиной смерти от рака в более чем 100 странах. По данным GLOBOCAN наиболее высокий уровень заболеваемости раком молочной железы наблюдается в Австралии / Новой Зеландии, Северной Европе (в Великобритании, Швеции, Финляндии и Дании), Западной Европе (в Бельгии, Нидерландах и Франции), Южной Европе (Италия) и Северной Америке. Относительно смертности, самая высокая смертность оценивается в Меланезии (рисунок 1) [4].
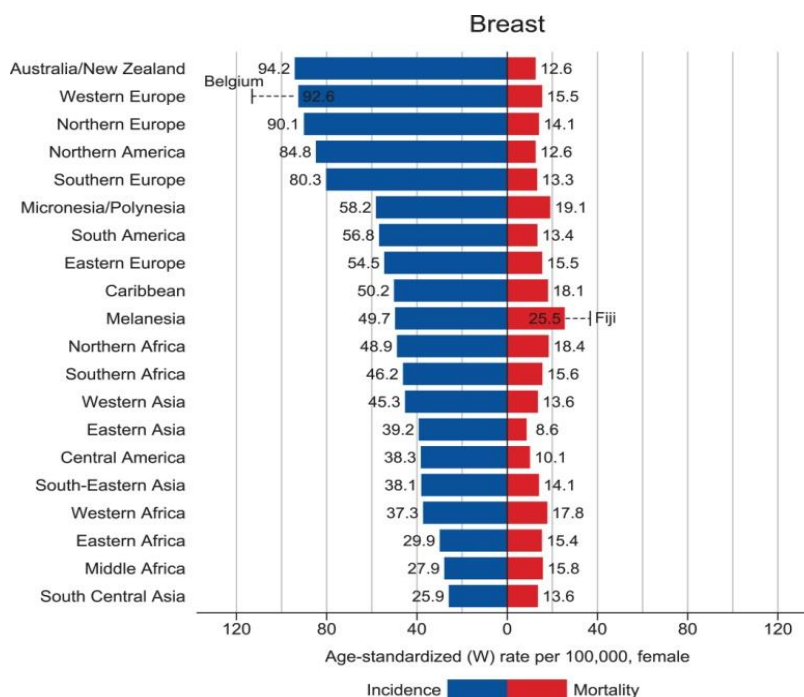

Рисунок 1 - Региональные стандартизованные по возрасту показатели заболеваемости раком молочной железы у женщин в 2018 году по данным GLOBOCAN 2018.

Рак молочной железы является основной проблемой общественного здравоохранения, а ранняя диагностика данной патологии имеет лучший прогноз и выживаемость. Пятилетняя выживаемость в Южной Африке составляет до 53%, в Соединенных Штатах до 89%, среди иорданских и арабских женщин до 60–65%, в секторе Газа 65,1% и 70% в Иране. В развитых странах показатели выживаемости повыше составляя 82% в Европе и 89% в США. В отличие от женщин, проживающих в развитых странах, у женщин в менее развитых странах новообразования молочной железы диагностируются в более поздней стадии развития вследствие ограниченного доступа к диагностике и лечению данной патологии. Международные оценки эпидемиологии рака молочной железы показывают, что заболеваемость раком молочной железы увеличивается для всех возрастов, в то время как смертность снижается. Это снижение показателей смертности во многом может быть связано с проведением скрининга и достижений в лечении рака молочной железы. Снижение смертности, обусловленное скринингом, может быть результатом более раннего выявления и лечения инвазивного рака, в дополнение к более активному обнаружению протоковой карциномы in situ, некоторые типы которой менее летальны [7].

Общеизвестным является тот факт, что новообразования молочной железы встречаются чаще в постменопаузальном периоде. Необходимо отметить, что течение заболевания в пременопаузе имеет свои особенности. Заболеваемость раком молочной железы ниже у женщин в возрасте от 40 до 49 лет, чем у женщин в возрасте от 50 до 69 лет (около 140 на 100 000 и 500 на 100 000 женщин, соответственно). Одним из объяснении данной тенденции является низкая чувствительность и специфичность маммографии. Повышенная плотность ткани молочной железы у молодых женщин в основном является причиной более низкой точности этой процедуры в возрастной группе 40-49 лет. Таким образом, это указывает на то, что маммография не может быть оптимальным методом скрининга для молодых женщин [8].

Несмотря на то, что рак молочной железы распространен больше среди женщин в постменопаузе, в последнее время наблюдалось значительное увеличение частоты данной патологии среди женщин до менопаузы [9]. По оценкам, приблизительно 5,6% пациентов с раком молочной железы имеют возраст ≤40 лет [10].

Рак молочной железы у молодых женщин требует особого внимания из-за его специфических морфологических и прогностических характеристик и уникальных аспектов, включая сохранение фертильности и психосоциальные проблемы. Молодые женщины чаще имеют тип рака молочной железы с более высокой частотой отрицательных клинико-патологических особенностей. Кроме того, они, как правило, диагностируются на более поздних стадиях заболевания, что в свою очередь, способствует менее благоприятному прогнозу по сравнению с женщинами в старшем возрасте [9].

Хотя наследственные и генетические факторы являются факторами риска развития рака молочной железы являясь причиной от 5% до 10% случаев, повышенные показатели заболеваемости в странах с переходной экономикой (в Южной Америке, Африке и Азии) являются следствием более высокой распространенности известных факторов риска, связанных с менструацией (ранний возраст при менархе, более поздний возраст при менопаузе), репродукцией (поздний возраст при первой беременности и меньшее количество детей), прием гормональных препаратов (использование оральных контрацептивов и заместительной гормональной терапии), питанием (употребление алкоголя). Данные обстоятельства отражают сочетание демографических факторов, связанных с социальным и экономическим развитием, включая позднего деторождения и уменьшение числа детей, повышение уровня ожирения и малоподвижного образа жизни, а также увеличение скрининга и осведомленности о раке молочной железы. В нескольких развитых странах, включая Соединенные Штаты, Канаду, Великобританию, Францию и Австралию, снижение заболеваемости в начале 2000-х годов было отчасти связано со снижением использования гормонального лечения в постменопаузе [4].

На основании многих исследований установлено повышенная распространенность новообразований молочной железы среди женщин в старших возрастных группах. Около трети случаев рака молочной железы в постменопаузе считается вызванным поведенческими факторами, которые изменяемые, такие как постменопаузальное ожирение, физическая неактивность, применение комбинированного эстрогена и прогестина в менопаузе, употребление алкоголя, исскуственное вскармливание. Многие факторы риска влияют на продолжительность жизни воздействие гормонов на ткани молочной железы (ранняя менархе, поздняя менопауза, ожирение и использование гормонов). Имеется предположение, что гормоны влияют на риск рака молочной железы путем увеличения пролиферация клеток, тем самым увеличивая вероятность повреждение ДНК, а также содействие росту рака.

В таблице 2 представлены основные факторы, связанные с повышенным риском

развития рака молочной железы установленные на основании проведенных исследований [11].

Таблица 2. Факторы риска для рак молочной железы у женщин

Относительный риск	Факторы
>4.0	▸ возраст (65+ лет) ▸ подтвержденная биопсией атипичная гиперплазия ▸ некоторые наследственные генетические мутации для рака молочной железы (BRCA1 и / или BRCA2) ▸ уплотнение обнаруженное в результате проведения маммографии ▸ два или более родственников первой степени родства с раком молочной железы диагностиранный в раннем возрасте
2.1-4.0	▸ высокие уровни эндогенного эстрогена или тестостерона ▸ высокая доза облучения грудной клетки ▸ один родственник первой степени родства с раком молочной железы
1.1-2.0	▸ употребление алкоголя ▸ воздействие диэтилстилбестрола ▸ раннее менархе (<12 лет) ▸ высокий рост ▸ высокий социально-экономический статус ▸ старший возраст при первой доношенной беременности (> 30 лет) ▸ поздняя менопауза (> 55 лет) ▸ исскуственное вскармливание ▸ отсутствие доношенных беременностей ▸ ожирение (в постменопаузе) ▸ эндометрит или рак яичников в анамнезе ▸ пролиферативное заболевание молочной железы без атипии ▸ недавнее и продолжительное применение гормональной терапии содержащие эстроген и прогестин ▸ недавнее использование оральных контрацептивов

Ранняя диагностика и скрининг имеют важное значение для снижения частоты встречаемости и повышение выживаемости при раке молочной железы. В условиях ограниченных ресурсов, где большинство женщин диагностируется в поздних стадиях, следует отдавать приоритет программам ранней диагностики, основанным на осведомленности о ранних признаках и симптомах рака молочной железы.

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STABILITY OF RIBBED VISCOELASTIC GEOMETRIC NONLINEAR CONIC SHELLS UNDER DYNAMIC LOADING

Abstract: *In this article, an exact mathematical model for the deformation of a viscoelastic (or polymer) conical shell and algorithms for its study is developed. Nonlinear mathematical models for the deformation of ribbed conical shells under dynamic loaded are obtained. A study of the stress-strain state and stability of viscoelastic panels of conical shells and truncated closed and revealed some characteristic features.*
Key words: *conical shell, panel, dynamics, load, nonlinear, model, stability, viscoelasticity*
Language: *Russian*

УСТОЙЧИВОСТЬ РЕБРИСТЫХ ВЯЗКОУПРУГИХ ГЕОМЕТРИЧЕСКИ НЕЛИНЕЙНЫХ КОНИЧЕСКИХ ОБОЛОЧЕК ПРИ ДИНАМИЧЕСКОМ НАГРУЖЕНИИ

Аннотация: В данной статей разработано точной математической модели деформирования вязкоупругой (или полимерной) конической оболочки и алгоритмов ее исследования. В получены нелинейные математические модели деформирования ребристых конических оболочек при динамических нагружённых. Проведено исследование напряженно-деформированного состояния и устойчивости вязкоупругих панелей конических оболочек и усечённых замкнутых и выявлены некоторые характерные особенности.

Ключевые слова: коническая оболочка, панель, динамика, нагрузка, нелинейный, модель, устойчивость, вязкоупругость, теория.

Введение

При решении задач устойчивости конических оболочек в линейной постановке часто применяется метод Эйлера [1,2]. Рассматриваемая задача сводится к отысканию действительных собственных значений [3]. Другой метод, основной использоваться для исследования оболочек, который позволяет перейти от уравнений устойчивости конических оболочек к соответствующим уравнениям для цилиндрических оболочек с кругового поперечного сечения. Во многих работах используется без моментная и полу безмоментная теория оболочек [4,5]. Также применяются приближённые методы для решения задачи нелинейных уравнений устойчивости [7,8]. Особую трудность вызывают задачи устойчивости подкреплённых конических оболочек в геометрически нелинейной постановке с учетом реологических свойств материала, решения для которых практически отсутствуют. Статья посвящена частично рещение этих проблем. В статье получены нелинейные математические модели деформирования ребристых вязкоупругих конических оболочек при динамических нагруженные.

Постановка задачи и методики решения.

Рассмотрим замкнутую круговую коническую оболочку с углом конусности Θ толщиной h (рисунок 1). Срединная поверхность оболочки принимается за координатную поверхность.

Оси X, Y ортогональной системы координат, направленных по линиям главных кривизн, показаны на рис. 1, ось Z направлена ортогонально срединной поверхности в сторону вогнутости.
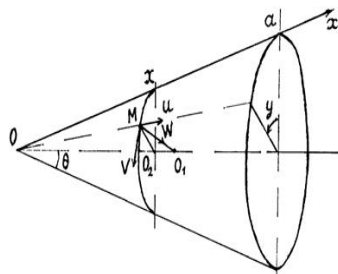

Рис. 1. Расчетная схема конической оболочки.

Срединная поверхность оболочки принимается за координатную поверхность. Оси X, Y ортогональной системы координат, направленных по линиям главных кривизна, показаны на рисунок 1, ось Z направлена ортогонально срединной поверхности в сторону вогнутости.

Для конической оболочки параметры Ляме приведены в работе [9], принимают следующий вид $A=1$, $B=x\sin\Theta$, а кривизны

$$k_x = 0, \; k_y = \frac{\operatorname{ctg}\Theta}{x}$$

Деформации в координатной поверхности оболочки выражаются через перемещения U, V, W вдоль осей X, Y, Z соответственно следующим образом

$$\varepsilon_x = \frac{\partial U}{\partial x} + \frac{1}{2}\left(\frac{\partial W}{\partial x}\right)^2;$$

$$\varepsilon_y = \frac{1}{x\sin\theta}\cdot\frac{\partial V}{\partial y} + \frac{U}{x} - \frac{\operatorname{ctg}\theta}{x}W + \frac{1}{2}\left(\frac{1}{x\sin\theta}\cdot\frac{\partial W}{\partial y} + \frac{\operatorname{ctg}\theta}{x}V\right)^2;$$

$$\gamma_{xy} = \frac{\partial V}{\partial x} + \frac{1}{x\sin\theta}\cdot\frac{\partial U}{\partial y} - \frac{V}{x} + \frac{\partial W}{\partial x}\cdot\left(\frac{1}{x\sin\theta}\cdot\frac{\partial W}{\partial y} + \frac{\operatorname{ctg}\theta}{x}V\right). \tag{1}$$

Деформации в слое, отстоящем на Z от координатной поверхности при учете поперечных сдвигов имеют вид

$$(U^z = U + z\cdot\psi_x, \; V^z = V + z\psi_y, \; W^z = W)$$

$$\varepsilon_x^z = \varepsilon_x + z\cdot\chi_1; \; \varepsilon_y^z = \varepsilon_y + z\cdot\chi_2; \; \gamma_{xy}^z = \gamma_{xy} + 2\cdot z\cdot\chi_{12} \tag{2}$$

и кроме того

$$\gamma_{xz} = k\, f(z)\cdot\left(\psi_x + \frac{\partial W}{\partial x}\right);$$

$$\gamma_{yz} = k\, f(z)\cdot\left(\psi_y + \frac{1}{x\sin\theta}\cdot\frac{\partial W}{\partial y} + \operatorname{ctg}\theta\frac{V}{x}\right). \tag{3}$$

Здесь ψ_x, ψ_y - углы поворота отрезка нормали у координатной поверхности в сечениях *XOZ* и *YOZ* соответственно; $f(z)$ - функция, описывающие распределение τ_{xz} и τ_{yz} касательных напряжений;

$$k = \text{const.}$$

Функции, характеризующие изменения кривизну χ_1, χ_2 и кручения χ_{12} имеет вид [2]

$$\chi_1 = \frac{\partial \psi_x}{\partial x}; \quad \chi_2 = \frac{1}{x \sin\theta} \cdot \frac{\partial \psi_y}{\partial y} + \frac{\psi_x}{x};$$

$$2\chi_{12} = \frac{\partial \psi_y}{\partial x} + \frac{1}{x \sin\theta} \cdot \frac{\partial \psi_x}{\partial y} - \frac{\psi_y}{x}.$$

Физические соотношения для изотропного вязкоупругого тела принимают вид [9]

$$\sigma_x = \frac{\tilde{E}}{1-\mu^2}\left(\varepsilon_x^z + \mu\varepsilon_y^z\right); \quad \sigma_y = \frac{\tilde{E}}{1-\mu^2}\cdot\left(\varepsilon_y^z + \mu\varepsilon_x^z\right);$$

$$\tau_{xy} = \frac{\tilde{E}}{2(1+\mu)}\gamma_{xy}^z; \tau_{xz} = \frac{\tilde{E}}{2(1+\mu)}\gamma_{xz}; \quad \tau_{yz} = \frac{\tilde{E}}{2(1+\mu)}\gamma_{yz}. \quad (4)$$

Здесь μ - коэффициент Пуассона материала оболочки, считается постоянными; $\tilde{E}_к$ операторные модули упругости

$$\tilde{E}_k f(t) = E_{0к}\left[f(t) - \int_0^t R_{E_к}(t-\tau)f(\tau)d\tau\right] \quad (5)$$

$E_{0к}$ - мгновенный модуль упругости Юнга; $f(t)$ - непрерывная функция; $R_{E_к}(t-\tau)$ - ядро релаксации. Предполагается, что интегралнке члени (5) малыми, тогда для функции $f(t)$ существуют функция $f(t) = \varphi(t)e^{-i\omega_R t}$. Тогда интегральные член заменяется слеедуюўими выражениями

$$\overline{E}_к\varphi = E_{0к}\left[1 - \Gamma_к^C(\omega_R) - i\Gamma_к^S(\omega_R)\right]\varphi,$$

где

$$\Gamma^C(\omega_R) = \int_0^\infty R(\tau)\cos\omega_R\tau\,d\tau, \quad \Gamma^S(\omega_R) = \int_0^\infty R(\tau)\sin\omega_R\tau\,d\tau$$

ответственно косинус и синус преобразования Фурье, ω_R -действительная величина. При вычислении используется трёхпараметрическое ядро Колтунова-Рижаница $R_k(t) = A_k e^{-\beta_k t}/t^{1-\alpha_k}$ [9]. Физически соотношения при учете ползучести материала (5) на основе линейной теории наследственности ползучести принимает вид [10]

$$\sigma_x = \frac{E}{1-\mu^2}\left[\varepsilon_x^2 + \mu\varepsilon_y^2 - \int_{t_0}^t (\varepsilon_x^2 + \mu\varepsilon_y^2)R_1(t,s)ds\right];$$

$$\sigma_y = \frac{E}{1-\mu^2}\left[\varepsilon_y^2 + \mu\varepsilon_x^2 - \int_{t_0}^t (\varepsilon_y^2 + \mu\varepsilon_x^2)R_1(t,s)ds\right];$$

$$\tau_{xy} = \frac{E}{2(1+\mu)}\left[\gamma_{xy}^2 - \int_{t_0}^t \gamma_{xy}^2 R_2(t,s)ds\right];$$

$$\tau_{xz} = \frac{E}{2(1+\mu)}\left[\gamma_{xz} - \int_{t_0}^t \gamma_{xz} R_2(t,s)ds\right];$$

$$\tau_{yz} = \frac{E}{2(1+\mu)}\left[\gamma_{yz} - \int_{t_0}^t \gamma_{yz} R_2(t,s)ds\right];$$

Здесь $R_1(t,s)$, $R_2(t,s)$ - функция вылияния (ядра реолакции Колтунова - Рижаница). Месторасположение и высоту ребер задается функцией

$$H(x,y) = \sum_{j=1}^m h^j \bar{\delta}(x-x_j) + \sum_{i=1}^n h^i \bar{\delta}(y-y_i) - \quad (6)$$

$$-\sum_{i=1}^n \sum_{j=1}^m h^{ij} \bar{\delta}(x-x_j)\bar{\delta}(y-y_i)$$

Интегрируя напряжения (4) по z в пределах от $-\frac{h}{2}$ до $\frac{h}{2}+H$, получим усилия, моменты и поперечные силы, приведенные к срединной поверхности оболочки, для единицу длины срединной поверхности,

$$N_x = G_1\left[(h+\overline{F})\cdot\varepsilon_1 + \overline{S}\psi_1\right];$$

$$N_y = G_2\left[(h+\overline{F})\cdot\varepsilon_2 + \overline{S}\psi_2\right];$$

$$N_{xy} = G_{12}\left[(h+\overline{F})\gamma_{xy} + \overline{S}\psi_{12}\right];$$

$$M_x = G_1\left[\overline{S}\varepsilon_1 + \left(\frac{h^3}{12}+\overline{J}\right)\psi_1\right];$$

$$M_y = G_2\left[\overline{S}\varepsilon_2 + \left(\frac{h^3}{12}+\overline{J}\right)\cdot\psi_2\right]; \quad (7)$$

$$M_{xy} = G_{12}\left[\overline{S}\gamma_{xy} + \left(\frac{h^3}{12}+\overline{J}\right)\psi_{12}\right];$$

$$Q_x = kG_{13}(h+\overline{F})\cdot\left(\psi_x + \frac{\partial W}{\partial x}\right),$$

$$Q_y = kG_{23}(h+\overline{F})\left(\psi_y + \frac{1}{x\sin\theta}\frac{\partial W}{\partial y} + \frac{\text{ctg}\theta}{x}V\right),$$

где

$$\varepsilon_1 = \varepsilon_x + \mu\varepsilon_y, \quad \varepsilon_2 = \varepsilon_y + \mu\varepsilon_x,$$

$$\psi_1 = \chi_1 + \mu\chi_2, \quad \psi_2 = \chi_2 + \mu\chi_1,$$

$$\psi_{12} = 2\chi_{12}, \quad G_1 = G_2 = \frac{\tilde{E}}{1-\mu^2}, \quad G_{12} = G_{13} = G_{23} = \frac{\tilde{E}}{2(1+\mu)};$$

$\overline{F}$, $\overline{S}$, $\overline{J}$ — площадь (поперечного или продольного) сечения ребер, приходящаяся на единицу длины срединной поверхности. Статический момент и момент инерции срединной поверхности оболочки имеет вид

$$\overline{F} = \int_{h/2}^{h/2+H} dz; \quad \overline{S} = \int_{h/2}^{h/2+H} z\,dz; \quad \overline{J} = \int_{h/2}^{h/2+H} z^2 dz.$$

Пусть на оболочку действует поперечная динамическая нагрузка $q(x,y,t)$. Тогда неизвестные искомые функции смещений U, V, W и углов поворота нормали ψ_x, ψ_y

является функциями следующих переменных x, y и t.

Функционал полной энергии деформации вязкоупругой оболочки имеет вид

$$J = \int_{t_0}^{t_1} (K - \Pi + A)\,dt. \qquad (8)$$

Здесь K - кинетическая энергия системы, Π - потенциальная энергия системы, A -работа внешних сил, где

$$K = \frac{\rho}{2} \int_{a_1}^{a} \int_{0}^{b} \int_{-h/2}^{h/2+H} \left[(\dot{U}^z)^2 + (\dot{V}^z)^2 + (\dot{W}^z)^2 \right] x\sin\theta\,dx\,dy\,dz =$$

$$= \frac{\rho}{2} \int_{a_1}^{a} \int_{0}^{b} \left[(h + \overline{F})(\dot{U}^2 + \dot{V}^2 + \dot{W}^2) + 2\overline{S}(\dot{U}\dot{\psi}_x + \dot{V}\dot{\psi}_y) + \right.$$

$$\left. + \left(\frac{h^3}{12} + \overline{J}\right)(\dot{\psi}_x^2 + \dot{\psi}_y^2) \right] x\sin\theta\,dx\,dy; \qquad (9)$$

$$Э = \Pi - A = \frac{1}{2} \int_{a_1}^{a} \int_{o}^{b} \left[N_x \varepsilon_x + N_y \varepsilon_y + N_{xy}\gamma_{xy} + M_x \chi_1 + \right.$$

$$+ M_y \chi_2 + 2M_{xy}\chi_{12} + Q_x\left(\psi_x + \frac{\partial W}{\partial x}\right) +$$

$$\left. + Q_y\left(\psi_y + \frac{1}{x\sin\theta}\cdot\frac{\partial W}{\partial y} + \frac{ctg\theta}{x}V\right) - 2qW \right] x\sin\theta\,dx\,dy, \qquad (10)$$

В выше приведённых формулах ρ - плотность материала оболочки; в выражениях (9) и (10) точками обозначены производные по переменной t; $b = 2\pi$ - конической оболочки. Энергия можно выразить через деформации, тогда выражение (10) представляется следующим виде;

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$$Э = \frac{E}{2(1-\mu^2)} \int_{a_1}^{a} \int_{0}^{b} \left[(h + \overline{F})\left(\varepsilon_x^2 + \varepsilon_y^2 + 2\mu\varepsilon_x\varepsilon_y + \mu_1\gamma_{xy}^2\right) + \frac{5}{6}\mu_1\left(\psi_x + \frac{\partial W}{\partial x}\right)^2 + \right.$$

$$+ \frac{5}{6}\mu_1\left(\psi_y + \frac{1}{x\sin\theta}\frac{\partial W}{\partial y} + \frac{ctg\theta}{x}V\right)^2 + 2\overline{S}\left(\chi_1\varepsilon_x + \chi_2\varepsilon_y + \mu\chi_2\varepsilon_x + \mu\chi_1\varepsilon_y + 2\mu_1\gamma_{xy}\chi_{12}\right) +$$

$$\left. + \left(\frac{h^3}{12} + \overline{J}\right)\left(\chi_1^2 + \chi_2^2 + 2\mu\chi_1\chi_2 + 4\mu_1\chi_{12}^2\right) - 2(1-\mu^2)\frac{q}{E}W \right] x\sin\theta\,dx\,dy, \qquad (11)$$

где

$$\mu_1 = \frac{1-\mu}{2}.$$

Если коническая вязкоупругая оболочка замкнута, тогда $a_1 = 0$. В статье рассмотрена подкрепления коническая оболочки узкими ребрами. Рассматриваемая задача решается в безразмерных параметрах. Тогда соотношение принимает следующий вид;

$$\xi = \frac{x}{a}, \quad \eta = \frac{y}{b}, \quad \lambda = \frac{a}{b\,x\sin\theta}, \quad \lambda = \frac{\lambda_1}{\xi}, \quad \overline{U} = \frac{aU}{h^2},$$

$$\overline{V} = \frac{b\,x\sin\theta V}{h^2}, \quad \overline{W} = \frac{W}{h}, \quad \overline{\psi}_x = \frac{a\psi_x}{h}, \quad \overline{\psi}_y = \frac{b\,x\sin\theta\psi_y}{h},$$

$$\overline{a} = \frac{a}{h}, \quad \overline{P} = \frac{a^4 P}{Eh^4}, \quad \overline{t} = \frac{h}{a^2}\sqrt{\frac{E_0}{(1-\mu^2)\rho}}t, \quad \overline{\overline{F}} = \frac{\overline{F}}{h}, \quad \overline{\overline{J}} = \frac{\overline{S}}{h^2}, \quad \overline{\overline{J}} = \frac{\overline{J}}{h^3}, \qquad (12)$$

получим

$$\overline{K} = \frac{1}{\overline{a}^2} \int_{a_1}^{1} \int_{0}^{1} \left[(1 + \overline{\overline{F}})(\dot{U}^2 + \lambda^2\dot{V}^2 + \overline{a}^2\dot{W}^2) + \right.$$

$$2\overline{\overline{S}}(\dot{U}\dot{\psi}_x + \lambda^2\dot{V}\dot{\psi}_y) + \left(\frac{1}{12} + \overline{\overline{J}}\right)(\dot{\psi}_x^2 + \lambda^2\dot{\psi}_y^2) \right]\xi\,d\xi\,d\eta. \qquad (13)$$

$$\overline{Э} = \int_{\overline{a}_1}^{1} \int_{0}^{1} \left[(1 + \overline{\overline{F}})\left(\overline{\varepsilon}^2 + \lambda^4\overline{\varepsilon}_y^2 + 2\mu\lambda^2\overline{\varepsilon}_x\overline{\varepsilon}_y + \mu_1\lambda^2\overline{\gamma}_{xy}^2\right) + \frac{5}{6}\mu_1\overline{a}^2\cdot\left(\overline{\psi}_x + \frac{\partial\overline{W}}{\partial\xi}\right)^2 + \right.$$

$$+ \frac{5}{6}\mu_1\lambda^2\overline{a}^2\cdot\left(\overline{\psi}_y + \frac{\partial\overline{W}}{\partial\eta} + \frac{c_3}{\xi}\overline{V}\right)^2 + 2\overline{\overline{S}}\left(\overline{\chi}_1\overline{\varepsilon}_x + \lambda^4\overline{\chi}_2\overline{\varepsilon}_y + \mu\lambda^2\overline{\chi}_2\overline{\varepsilon}_x + \mu\lambda^2\overline{\chi}_1\overline{\varepsilon}_y + \right.$$

$$2\mu_1\lambda^2\overline{\gamma}_{xy}\overline{\chi}_{12}) + \left(\frac{1}{12} + \overline{J}\right)\cdot\left(\overline{\chi}_1^2 + \lambda^4\overline{\chi}_2^2 + 2\mu\lambda^2\overline{\chi}_1\overline{\chi}_2 + 4\mu_1\lambda^2\overline{\chi}_{12}^2\right) -$$

$$- 2(1-\mu^2)\overline{P}\,\overline{W} \right]\xi\,d\xi\,d\eta. \qquad (14)$$

Получена нелинейная зависимости деформирования вязкоупругой оболочки без учета поперечных сдвигов, а также выведены уравнения в смешанной форме [10-12].

В частные случаи получено нелинейное выражение энергии деформирования ребристой вязкоупругой конической оболочки при статических нагруженных.

Таким образом, получено математическая формула основные выражения вязкоупругих конических оболочек ступенчато-переменной толщины при статических, квазистатических и динамических нагруженных. Который учитывают геометрическую нелинейность, дискретное введение вязкоупругих рёбер, их сдвиговую и крутильную жёсткость, поперечные сдвиги и инерцию вращения.

Численные результаты и анализ.

Рассматриваются вязкоупругих панели конических оболочек, которые шарнирно неподвижно закрепленные по контуру. Коническая оболочка находится под действием равномерно распределенной поперечной нагрузкой и

подкрепленной ребрами высотой 4h и шириной 2h. Параметры конической оболочки, изготовленной из стали, имеют следующие значения: угол конусности $\Theta = 0,003477$; размеры вдоль оси x

$a_1 = 15м, a = 18м$ (протяженность оболочки 10 метров); угол разворота оболочки $y_k = 1,57$ значение реологических параметров примем в виде $A = 0,048$; $\beta = 0,05$; $\alpha = 0,1$.
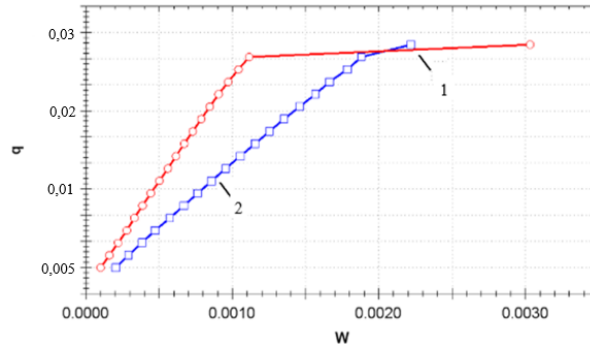

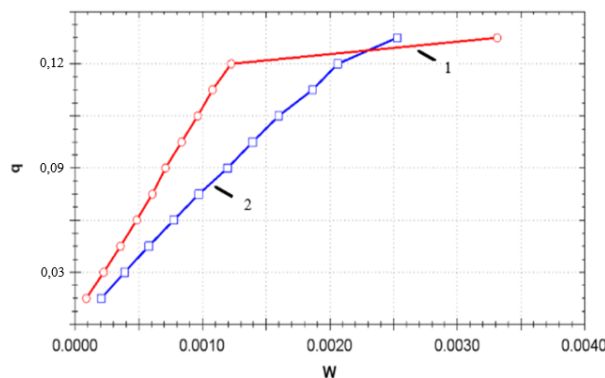**Рисунок 2**. **Зависимость прогиба от нагрузки** $(y_k = 1,57)$: **1-вязкоупругая оболочка, 2- четырёх ребрная оболочка**

Рисунок 3.Зависимость прогиба от нагрузки ($y_k = 1,80$): **1-вязкоупругая оболочка, 2- четырех рёберная оболочка.**

На рис. 2 представлены графики «нагрузка q-прогиб W» для вязкоупругой оболочки без ребра и подкрепленных четырёх ребра по каждый направление по две ребра ($y_k = 1,57$).

На рис. 3 представлены графики «нагрузка q-прогиб W» для вязкоупругой оболочки 4 ребрами по два в каждом направлении ($y_k = 1,80$).

Как видно из рис.3 подкрепление оболочки четырём ребрами позволяет, увеличит критическую нагрузку. Также с увеличением угла разворота, жесткость вязкоупругой оболочке увеличивается, и критическая нагрузка возрастают. Для стальной оболочки протяженностью 10м при толщине 1 см критические нагрузки получилось высокими. Для оболочки из оргстекла критическая нагрузка для вязкоупругой оболочки с углом разворота $y_k = \pi$ составит $q_k = 0,5 \cdot 10^{-2}$ МПа, а с углом разворота $y_k = 1.57$, $q_{kp} = 0,12 \cdot 10^{-2}$ Мпа,

значение реологических параметров примем в виде $A = 0,048$; $\beta = 0,05$; $\alpha = 0,1$.

Также исследуется устойчивость ребристых вязкоупругих панелей конических оболочек при динамических награждения. Безразмерная нагрузка берется в виде $\overline{P} = A \cdot \overline{t}$, где A характеризует скорость награждения. Для анализа достоверности получаемых результатов был проведен расчет вязкоупругих панели конической оболочки, отстоящей от вершины на большое расстояние. Результаты, критические нагрузки, сравнивается результатами работ других исследователей. На рис. 4 представлены графики «нагрузка $\overline{P}$ - прогиб $\overline{W}$» в центре панели конической оболочки с параметрами a_1=20 м; a =30 м; h =0,01 м; y_k=1,57; Θ =0,5235; значение реологических параметров примем в виде $A = 0,048$; $\beta = 0,05$; $\alpha = 0,1$.
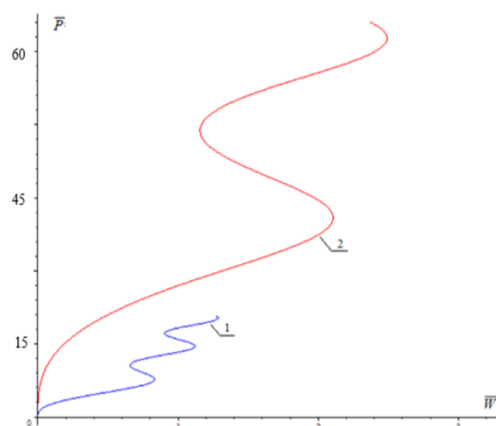
Рис. 4. Зависимость нагрузка $\overline{P}$ и прогиб $\overline{W}$ в центре панели конической оболочки: Кривая 1 - A=10, 2- A=100.

Исследования устойчивости ребристых вязкоупругих панелей конических оболочек при динамических нагруженных показали, что с увеличением скорости нагруженные критические нагрузки существенно возрастают, а время наступления потери устойчивости сокращается. При подкреплении оболочки критические нагрузки так же существенно возрастают. Учет реологических свойств материала позволяет увеличит критические значение оболочки до 6-8%

Выводы.

1. Разработаны алгоритмы решения нелинейных задач для ребристых вязкоупругих конических оболочек при статическом и динамическом нагружении. Для решение динамических задач применяется метода Л. В. Канторовича, метод замораживания и метода Рунге-Кутта 4-го порядка точности.

2. Выявлены особенности деформирования вязкоупругой панелей ребристых конических оболочек, что наибольшие напряжения и перемещения достигается к более широкой части оболочки. Для слабо конических вязкоупругих оболочек наибольшие напряжения достигается в областях близких к угловым точкам оболочек.

3. Исследована устойчивость вязкоупругой ребристых конических оболочек при различной жесткости и показано, что при увеличении угла разворота панели оболочек ее жесткость и критические нагрузки увеличиваются. Наличие ребер способствует существенно увеличение критические нагрузки.

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ON THE DYNAMIC STRESSED-DEFORMED STATE OF ISOTROPIC RECTANGULAR PLATES ON AN ELASTIC BASE WITH VIBRATION LOADS

Abstract: *The problem of calculating the dynamic stress-strain state of viscoelastic rectangular isotropic plates on a deformed base, including freely lying on the ground medium under the influence of vibration loads, is solved. Several models of the dynamic reaction of the base are considered and a qualitative comparison of the results is carried out. In the calculations, the Gauss method, the Mueller method and the smallest residuals were used.*

Key words: *rectangular plate, deformed base, stress-strain state, Gauss method, Mueller method and least residuals.*

Language: *English*

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Introduction

Rectangular plates with variable geometric and mechanical parameters located under dynamic vibration loads are used in various industries and construction. A rectangular transversely dynamically loaded plate can rest on a deformable (elastic or viscoelastic) base. For example, in the coverings of roads, bridges or runways of airfields. To study the dynamic strength and bearing capacity of such structures, knowledge of their dynamic stress-strain state under vertical loads is required. The problem of bending vibrations of viscoelastic plates on an elastic base is an urgent problem in the mathematical theory of viscoelasticity. In a closed analytical form, its solution, to simplify the elastic formulation, manages to obtain a limited number of boundary value problems. An alternative approach to finding an approximate or semi-analytical solution of an elastic problem is to present the solution in the form of a series [1,2,3]. The authors of [4] propose, using the variation method for elastic problems, to reduce the resolving equations to a system of ordinary differential equations. The disadvantage of these methods is their explicit dependence on the methods for setting the boundary conditions and patterns of loading. In [4], a finite-difference approach is used for statically loading, which in turn leads to difficulties in the implementation of boundary conditions. For high-order differential equations, a large template is used. All of the above reasoning necessitates the development of effective methods for solving boundary value problems of plate theory operating on a deformable base.

Problem statement and solution methods In this paper, for the numerical solution of the problem of plate bending, the method of collocations and least residuals (KNI) is used. The KNN method has proven itself in solving ordinary differential equations and partial differential equations for hydrodynamic problems [6]. It is used for the first time to calculate the VAT of plates. Consider a rectangular plate on an elastic base.
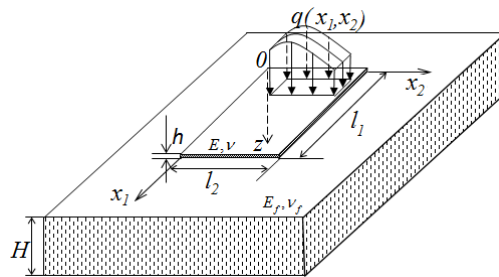

Fig.1. Plate on an elastic base

Problem statement and solution methods In this paper, for the numerical solution of the problem of plate bending, the method of collocations and least residuals (KNI) is used. The KNN method has proven itself in solving ordinary differential equations and partial differential equations for hydrodynamic problems [6]. It is used for the first time to calculate the VAT of plates. Consider a rectangular plate on an elastic base. The elastic base reaction will be considered using a one-parameter model based on the Winkler hypothesis (hereinafter referred to as the Winkler model) [5-10], and two more complex two-parameter models of Vlasov [4] and Pasternak [8]. Winkler's hypothesis suggests that the reaction of the base is proportional to the deflection of the slab

$$p = k_m \left(w - \int_0^t R(t - \tau) w(\tau) d\tau \right), \qquad (1)$$

Where p - is the reaction of the base, w -is the deflection of the slab, k_m -is the instantaneous bed coefficient (proportionality coefficient), determined experimentally for each type of soil. Despite its simplicity, in many cases the use of this model is sufficient to obtain practical results. However, this representation of the reaction of the soil has several disadvantages. For example, external loads are distributed on the soil only within the area of the bottom of the slab. This position does not correspond to real observations, according to which the soil settles, and therefore is stressed outside the plate. Another disadvantage k -is the difficulty in determining the value of the bed coefficient, which depends on the size and shape of the test stamp. A more complex model of soil reaction is embedded in two-parameter models.

In [8] it C_1 is proposed to obtain coefficients from the following considerations. connects the intensity of the vertical rebound of the soil with its sediment, and the second independent coefficient allows you to determine the intensity of the vertical shear force. The following possible parameter values are also given

$$p = C_{m1}(w - \int_0^t R_1(t-\tau)w(\tau)d\tau) - \\ - C_{m2}(\Delta w - \int_0^t R_2(t-\tau)\Delta w(\tau)d\tau) \qquad (2)$$

Where Δ -is the Laplace operator, C_{m1}, C_{m2} -are the soil parameters. Here, in addition to the work of the base for compression (Winkler hypothesis), the work of the base for shear or shear is additionally taken into account. In [4], the authors present the base as a medium in which there are no longitudinal (along the plane of the resting plate) displacements. Then the coefficients can be determined by the following formulas

$$C_{m1} = \frac{E_0}{1-v_0^2}\int_0^H (\phi'(z))^2 dz,$$

$$C_{m2} = \frac{E_0}{2(1+v_0)}\int_0^H (\phi(z))^2 dz$$

$$E_0 = \frac{E_f}{1-v_f^2}, \quad v_0 = \frac{v_f}{1-v_f}, \qquad (3)$$

E_f, v_f - the instantaneous Young's modulus and the Poisson's ratio of the elastic base, $\phi(z)$ -is the transverse distribution function of the elastic base, which characterizes the extinction of the soil tension with increasing depth H . In that work

$$\phi(z) = \frac{1}{2i}(e^{\gamma(z-H)} - e^{\gamma(H-z)})\sin(i\gamma H)$$

Where. $\gamma = 1.5$ In [8] it is proposed to obtain coefficients from the following considerations. Connects the intensity of the vertical rebound of the soil with its sediment, and the second independent coefficient allows you to determine the intensity of the vertical shear force. The following possible parameter values are also given

$$C_{m1} = \frac{E_0 H^{-1}}{1-2v_0^2}, \quad C_{m2} = \frac{E_0 H}{6(1+v_0)} \qquad (4)$$

Let's move on to the mathematical formulation of the problem. In a rectangular area, we consider a boundary value problem that describes the bending of the plate taking into account the reaction of the elastic base (Fig. 1) [1,4].

$$D(\Delta\Delta w(x_1,x_2,t) - \int_{-\infty}^t R(t-\tau)\Delta\Delta w(x_1,x_2,\tau)d\tau) + \\ + \rho H \frac{\partial^2 w}{\partial t^2} = q(x_1,x_2,t) - p(x_1,x_2,t)$$

where $w(x_1,x_2,t)$ -deflection of the plate; $q(x_1,x_2,t)$ - external load; $p(x_1,x_2,t)$ - reaction of the elastic base; $D = E_0 h^2/(12(1-v^2))$ - cylindrical stiffness; l_1, l_2 , h - length, width, thickness of the plate; E_0, v - moments young's modulus and Poisson's ratio of the

plate.The el astic base reaction is determined for each model from the corresponding formulas (1), (2) with coefficients (3) or (4). We $p(x_1,x_2) \equiv 0$ obtain the classical equation of plate bending [1].

On the edges of the plate, we will use the known boundary conditions [1]. For $x_1 = 0$ example, when there may be a free edge:

$$\left(\frac{\partial^2 w}{\partial x_1^2} + v\frac{\partial^2 w}{\partial x_2^2}\right) = 0, \qquad \left(\frac{\partial^3 w}{\partial x_1^3} + (2-v)\frac{\partial^3 w}{\partial x_1 \partial x_2^2}\right) = Q^f .$$

Special attention should be paid to the size . This function can be interpreted as the influence of the soil outside the plate on its edges [4,8]. Since the Winkler model does not account for this effect, then for her . For two-parameter models, it takes the following form [4]

$$Q^\Phi = C_2\left(\alpha w + \frac{\partial w}{\partial x_1} - \frac{1}{2\alpha}\left(\frac{\partial^2 w}{\partial x_2^2}\right)\right), \quad \alpha = \sqrt{C_{m1}/C_{m2}} .$$

Similarly, you can write conditions on other edges of the plate. Let's cover the Ω area with a rectangular grid uniform in each direction with cells Ω ($i=1,..., N$). To determine the solution in each cell, we will use the domain decomposition method-the method of iterations on subdomains (the alternating Schwartz method), in which the subdomain is a cell. In each cell, a local coordinate system is entered, associated with the source variables by the following formulas $y_1 = (x_1 - x_1^*)/h_1$, $y_2 = (x_2 - x_2^*)/h_2$, where, $2h_1, 2h_2$ - cell dimensions in the direction, x_1, x_2 respectively; (x_1^*, x_2^*) - cell center coordinate. In each cell, we present the approximate solution as a fourth-degree polynomial and write a local system of linear algebraic equations to determine the unknown coefficients. This system includes.

collocation equations

$$D_0\left(\frac{h_2^2}{h_1^2}\frac{\partial^4 w_i^k}{\partial y_1^4} + 2\frac{\partial^4 w_i^k}{\partial y_1^2 \partial y_2^2} + \frac{h_1^2}{h_2^2}\frac{\partial^4 w_i^k}{\partial y_2^4} - \\ - \int_{-\infty}^t R_i^k(t-\tau)\left(\frac{h_2^2}{h_1^2}\frac{\partial^4 w_i^k(\tau)}{\partial y_1^4} + \frac{\partial^4 w_i^k(\tau)}{\partial y_1^2 \partial y_2^2} + \frac{h_1^2}{h_2^2}\frac{\partial^4 w_i^k(\tau)}{\partial y_2^4}\right)d\tau - \\ - C_{m2}\left(h_2^2\frac{\partial^2 w_i^k}{\partial y_1^2} + h_1^2\frac{\partial^2 w_i^k}{\partial y_2^2}\right) + \\ + h_2^2 h_1^2 C_{m1} w_i^k + \rho H\frac{\partial^2 w}{\partial t^2} = h_2^2 h_1^2 q,$$

where w_i^k - решение в ячейке Ω_i на k -ой итерации; *terms of agreement*

$$w_i^k + \frac{1}{h_n}\frac{\partial w_i^k}{\partial n} = w_j + \frac{1}{h_n}\frac{\partial w_j}{\partial n}$$

$$\frac{\partial^2 w_i^k}{\partial n^2} + \frac{1}{h_n}\frac{\partial^3 w_i^k}{\partial n^3} = \frac{\partial^2 w_j}{\partial n^2} + \frac{1}{h_n}\frac{\partial^3 w_j}{\partial n^3};$$

Where w_j is the solution from the neighboring cell on the k -th iteration if Ω_j "calculated" and $(k-1)$ - th

otherwise; n - external normal to the boundary Ω_i;

boundary condition $w_i^k = 0$, $\dfrac{\partial w_i^k}{\partial n} = 0$ in case of pinching.

The local system of linear algebraic equations consists of 9 Integra-differential collocation equations written at the inner points of the cell. Also, at each cell boundary, depending on whether this boundary is adjacent to the boundary of the source region, three matching conditions or three boundary conditions are written. The resulting SLOUGH will be redefined. Its solution will be understood in the sense of least squares.

Numerical results.

Consider a rectangular plate on an elastic base under the action of a uniform dynamic load $q = Q_0 e^{-ipt}$.

(a)

(b)

(c)
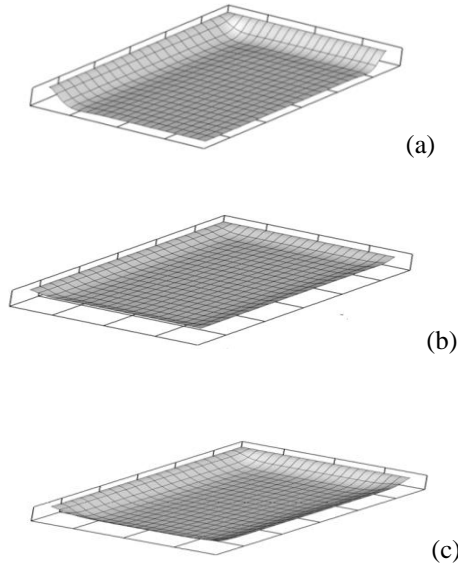
Fig. 2. The shape of the amplitude of a uniformly loaded plate whose two edges are pinched for the Winkler (a), Vlasov (b), and Pasternak (c) models.

Two adjacent sides of the plate are pinched, the other two are free. In the experiment, calculations are given for three models of the base (Fig. 2, 3) for the parameters $l_1 = 2l_2 = 20\,\text{m}$, $h = 0.1\,\text{m}$, $H = 2\,\text{m}$, $E_0 = 200\text{GPa}$, $v = 0.28$, $E_f = 0.4$ GPa, $v_f = 0.4$, $k = 0.3\,\text{GPA/m}$, $Q_0 = 1\text{MPa}$.
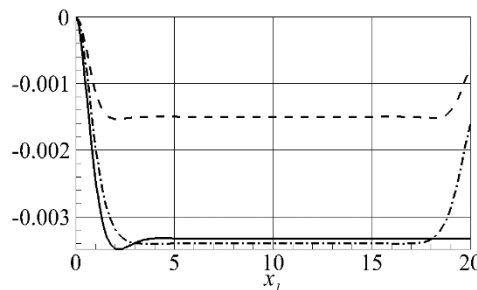
Fig. 3. Section of the amplitude of the deflection of the plate at, two edges of which are pinched, for the models of Winkler (solid), Vlasov (dashed), Pasternak (dashed).

The figures show that for two Q^f-parameter models, taking into account the function on the free edge leads to its lifting, which from the point of view of real experience is more logical than for the case of the Winkler model, when the free edge is deformed without bending.
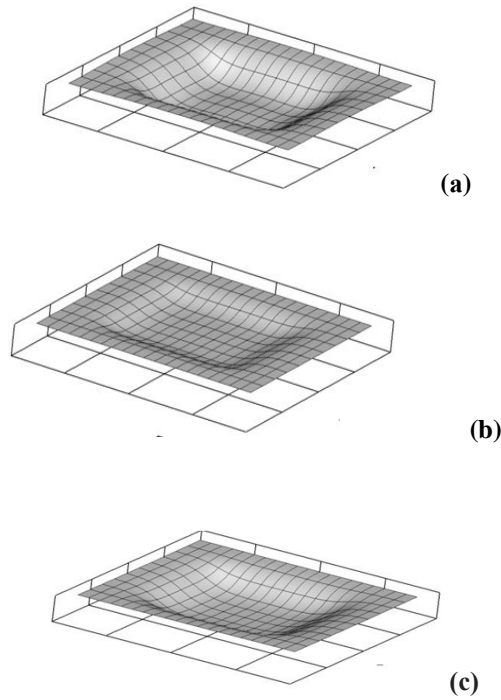
(a)

(b)

(c)

Fig. 4. The shape of the amplitude of the free-lying plate on the ground under a special load for the models of Winkler (a), Vlasov (b), Pasternak (c).
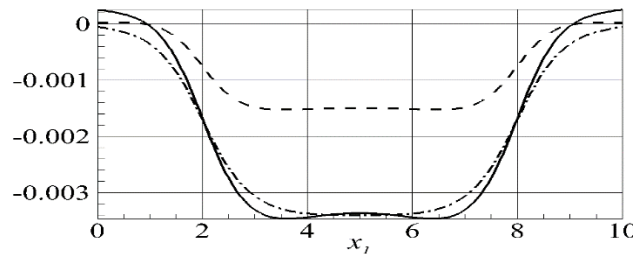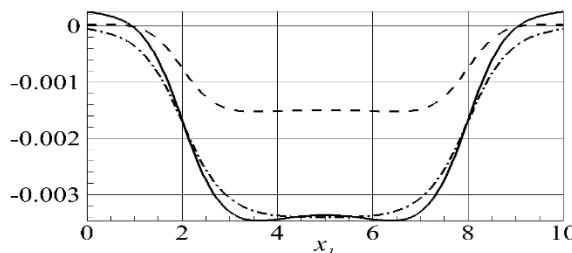

Fig. 5. Section of the amplitudes of the deflection of the free-lying plate on the ground for the models of Winkler (solid), Vlasov (dashed), Pasternak (dashed).

Consider a square plate, free-lying on the ground, simulating, for example, the Foundation of the bridge support. The plate is under the action of a uniform dynamic (harmonic) load applied to the region $[2,8]\times[2,8]$ (Fig.4,5), $l_1 = l_2 = 10$ m, $h = 0.1$ m, $H = 2$ m, $E = 200$ GPa, $v = 0.28$, $E_f = 0.4$ GPa, $v_f = 0.4$,

$k = 0.3$, $Q_0=1$ MPa.

In this case, the deflection of the plates does not depend qualitatively on the choice of the base reaction model, since the values of deflections on the contour are small.

Fig. 5. Section of the amplitudes of the deflection of the free-lying plate on the ground for the models of Winkler (solid), Vlasov (dashed), Pasternak (dashed).

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Consider a square plate, free-lying on the ground, simulating, for example, the Foundation of the bridge support. The plate is under the action of a uniform dynamic (harmonic) load applied to the region $[2,8] \times [2,8]$ (Fig.4,5), $l_1 = l_2 = 10$ m, $h = 0.1$ m, $H = 2$ m, $E = 200$ GPa, $v = 0.28$, $E_f = 0.4$ GPa, $v_f = 0.4$,

$k = 0.3$, $Q_0 = 1$ MPa.

In this case, the deflection of the plates does not depend qualitatively on the choice of the base reaction model, since the values of deflections on the contour are small.

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SCRUNITY OF POLYMERIZATION AND CO-POLYMERIZATION OF SOME BROMINE-CONTAINING MONOMERS VINYLSERIES

Abstract: *The article extends the results of kinetic studies of some halogen-containing vinyl monomers. Analyzing the behavior of bromine-containing monomers in binary systems with amino compounds revealed the occurrence of spontaneous polymerization of some monomers with an active bromine atom when they interact with tertiary amines. This is clarified by the activity of the bromine atom, which manifests itself in the dependence of the structure of the bromine-containing component.The goal of the work was to study the influence of functional groups on the reactivity of a double bond in halogen-containing vinyl monomers.When researching the kinetics of the copolymerization of bromine-containing monomers with acrylonitrile, into the bargain,studying the mutual influence of the bromine atom and double bond in the monomers under study, it was shown that the presence of a reactive bromine atom greatly influences the copolymerization process and the properties of the resulting copolymers, which makes it possible to more purposefully, moreover to implement the synthesis of a number of macromolecular compounds, as well as their further chemical transformation.*

Key words: *polymerization, copolymerization, bromine-containing monomer, spontaneous polymerization, reaction kinetics, polymerization rate.*

Language: *English*

Citation: Safaev, U. A., & Karabaeva, Z. T. (2020). Scrunity of polymerization and co-polymerization of some bromine-containing monomers vinylseries. *ISJ Theoretical & Applied Science, 02 (82),* 368-375.

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Introduction

Halogen-containing polymers and copolymers are widely used as flame-retardant polymers, flame retardants, reactive polymers in various sectors of the economy.

The presence of a halogen atom in the structure of polymers and copolymers makes it possible to accomplish various polymer-analogous transformations with the aim of introducing functional groups into the macromolecule and imparting specific properties to the synthesized products [3,7].

Discussion

It was launched that reactive halogen-containing monomers interact with amino compounds and in this case the initiation process occurs, as a result of which polymers are formed by polyelectrolyte properties. For a systematic study of the polymerization process, a homologous series of the following monomers was compiled: vinyl bromide, allyl bromide, bromstyrene, vinyl bromoacetate and vinylbenzyl bromide. The main indicators of the selected monomers are presented in table 1. To reap the kinetic indicators of the polymerization and copolymerization reactions, dilatometric and spectroscopic methods were used.

For the time of study, it was found that not all bromine-containing monomers interact with amino compounds and spontaneous polymerization does not occur.

Based on preliminary studies, it was originatedthat vinyl bromide and bromostyrene do not react with amino compounds. Along with allyl bromide reacts with tertiary amines and a quaternary monomeric salt is formed, which does not enter the polymerization reaction due to degradation chain transfer.

Table 1 - Structural formula and main indicators of monomers

No	Monomers	mol.mas	T bale, ° C	Refractive index	The results of the interaction with tertiary amines
1	Vinyl bromide $CH_2=CH$ Br	107	14-15	1,5286	The reaction does not proceed
2	Allyl bromide $CH_2=CH$ CH_2Br	121	71-72	1,3980	Quaternarysaltforms
3	Bromstyrene $CH_2=CH$ (benzene ring) Br	183	68-69 at 1.33 kPa	1,5415	The reaction does not proceed
4	Vinyl bromoacetate $CH_2=CH$ O $O=C-CH_2Br$	165	32-33 at 1,33k Pa	1,4526	Spontaneouspolymerizat ionoccurs
5	Vinyl benzyl bromide $CH_2=CH$ (benzene ring) CH_2Br	197	82-84 at 1,33 k Pa	1,5932	Spontaneouspolymerizat ionoccurs

The results of experimental studies showed that the interaction of vinylbenzyl bromide (WBB) and vinyl bromoacetate (WBA) with tertiary and polyamines in organic solvents such as ethyl alcohol, dioxane, benzene undergoes spontaneous polymerization at relatively low temperatures. Studying the interaction of allyl bromide with amino compounds showed that the process is limited by the Menshutkin reaction — the formation of a quaternary ammonium monomer salt due to the low polymerization ability of allyl monomers despite the appearance of charged atoms in the monomer molecule. At the same time, under the same conditions, vinyl bromide and bromostyrene do not

enter into the Menshutkin reaction due to the low mobility of the bromine atom.

Results

The increased activity of the bromide atom of the WBB group is explained by resonance stabilization, where an aromatic ring is involved in the resonance and the charge is distributed between the side chain atoms and ring atoms [4]. As a result, vinylbenzyl bromide easily reacts with Menschutkin in the reaction with tertiary amines (TAs). As a result, the nitrogen atom is positively charged, which enhances the polarization of the double bond. This, in turn, contributes to the course of spontaneous polymerization according to the following scheme:

$$CH_2 = CH \quad + \quad NR_3 \quad \longrightarrow \quad \sim CH_2 - CH \sim$$

with $-CH_2Br$ reacting to form $-CH_2\overset{\oplus}{N}R_3\overset{\ominus}{B}r$

where NR3 are tertiary amines.

In this instance, high molecular weight products are formed containing quaternary ammonium groups in each aromatic nucleus, i.e. only quaternized vinylbenzyl bromide molecules enter into the reaction, which is proved by potentiometric titration of aqueous polymer solutions into bromine ions (Table 2), which are close to the theoretically calculated content (25.16% for PVBB: DMA; 31.25% for PVBB: TMA) and to the results of elemental analysis for bromine.

Table 2 - Polymerization conditions and some physicochemical properties of polymers obtained based on the interaction of vinylbenzyl bromide with tertiary amines (conversion = 25%)

T,⁰C	liquid	The molar ratio of WBB: TA	Brominecontent, %		ηpr (1% aqueous solution) dl / g	Exchangecapacity, mEq / g
			Потенциометрическое титрование Potentiometric titration	Analysiselement		
Vinylbenzylbromide + dimethylaniline						
30	Ethanol	1:1	24,6	24,5	0,19	2,8
40	-	1:1	24,9	24,9	0,16	3,0
50	-	1:1	24,8	24,7	0,11	2,8
40	Dioxane	1:1	25,1	24,8	0,20	3,0
40	Benzene	1:1	24,9	24,9	0,25	2,9
40	Inmass	1:1	24,8	24,9	0,30	2,9
50	Dioxane	1:1	25,1	25,0	0,18	3,0
50	Dioxane	2:1	23,5	25,0	0,17	2,4
Vinylbenzylbromide + trimethylamine						
0	Ethanol	1:1	30,8	30,6	1,48	3,7
0	Dioxane	1:1	31,1	31,0	1,42	3,8
25	Dioxane	1:1	30,9	31,0	1,30	3,8
25	Dioxane	1:2	30,5	30,6	1,32	3,8
25	Dioxane	2:1	27,8	31,2	1,25	3,6

The individuality of the obtained polymers is also confirmed by the removal of UV spectra, where in the region of 250-260 nm there is an absorption band characteristic of quaternary ammonium groups.

In the EPR spectra of the vinylbenzyl bromide + dimethylaniline system, taken under various conditions directly and indirectly, radical formation is not observed.

For collation, the IR spectra of polyvinylbenzyl bromide (PVBB) and polyvinylbenzyl dimethyl phenyl ammonium bromide (PVBDMFAB) were studied. The absorption band in the 1225 cm – 1 region, related to the deformation vibrations of the CH2Br group, is completely absent in the spectrum of PVBDMFAB obtained at an equimolar content of the starting materials. This indicates the complete quaternization of dimethylaniline with vinyl benzyl bromide, accompanied by spontaneous polymerization.

To clarify the reaction between vinylbenzyl bromide and amino compounds, the NMR spectra of the starting components and their mixtures in time were recorded (Figure 1).
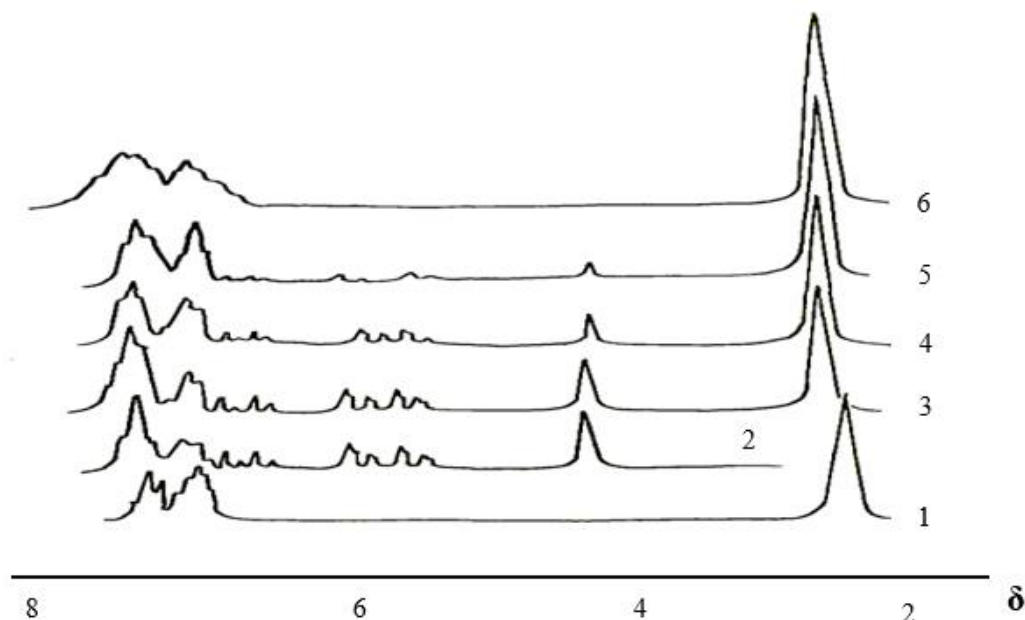
Figure 1 - PMR spectra of the system vinylbenzyl bromide + dimethylaniline: 1- dimethylaniline; 2 – vinylbenzyl bromide; 3 - immediately after the draining of the initial components; 4 - after 1 hour; 5 - after 2 hours; 6 - in 24 hours.

In the NMR spectrum, taken 5 minutes after mixing the components (vinylbenzyl - bromide + dimethylaniline), all the signals of both components are preserved, but the signal circuit changes significantly:

- the signal from the proton of the methyl group at the nitrogen atom, detected in the spectrum of dimethylaniline in the form of a three-proton singlet (2.5 ppm), began to shift to a weak field (2.65 ppm) obviously due to the quaternization of the nitrogen atom of dimethylamine groups

- there is a decrease in signal intensity during a chemical shift of 4.1 ppm, related to the protons of methylene - CH2Br-group of vinylbenzyl bromide;

- the proton signals of the vinyl groups of vinylbenzyl bromide (5.25 and 6.65 ppm) are slightly shifted to a weak field (5.35 and 6.75 ppm).

These data confirm the formation of monomeric salt in the early stages of the process occurring during the interaction of vinylbenzyl bromide with dimethylaniline. The time dependence of the change in the intensity of the signals of -CH2Br and CH3-N-CH3 groups can be expressed as the quantitative timing of the Menshutkin reaction.

For this day forward, a decrease in the signal intensity of the zrotons of not only the CH2-Br group, but also the protons of the vinyl group of vinylbenzyl bromide is observed. This indicates that the salt formation of vinylbenzyl bromide is accompanied by spontaneous polymerization.

In the NMR spectrum, taken after 24 hours, there are no signals of protons of the vinyl and bromomethyl groups, which indicates the cessation of polymerization and the complete consumption of the initial components of the protons of the vinyl and bromomethyl groups, which indicates the cessation of polymerization and the complete consumption of the initial components.
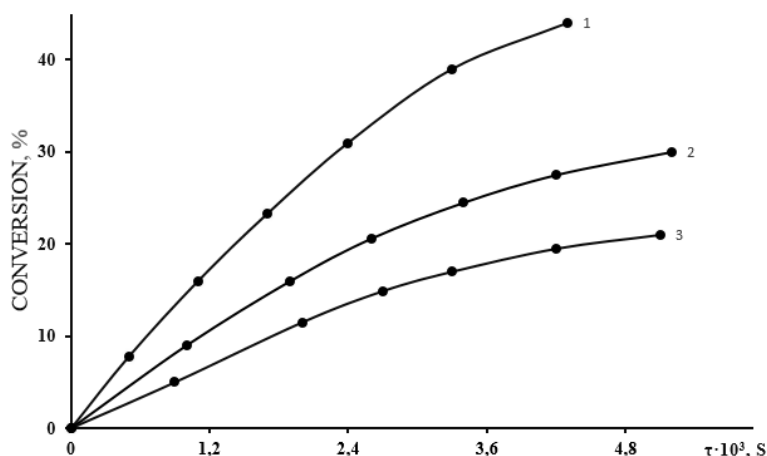
Figure 2 - Effect of the nature of the medium on the spontaneous polymerization rate of vinylbenzyl bromide with dimethylaniline T = 40 ° C, 1 - ethanol, 2 - benzene, 3 - dioxane

A study of the impact of the nature of solvents on the process of spontaneous polymerization showed that the reaction rate in polar media is greater than in nonpolar media (Figure 2). The increase in the rate of spontaneous polymerization during the interaction of vinylbenzyl bromide with dimethylaniline with an increase in the polarity of the medium is apparently associated with an acceleration of the Menshutkin reaction, which is the initial stage of the process and with an increase in the degree of dissociation of the quaternary salt in polar media, which leads to the appearance of a positive charge on the nitrogen atom. This, in turn, leads to an increase in polarization of the double bond and acceleration of spontaneous polymerization.

To clarify the effect of temperature on the rate and to calculate the total activation energy of spontaneous polymerization of vinylbenzyl bromide in the interaction with dimethylaniline, average reaction rates were determined at the initial stage of the stationary process at temperatures of 30, 40, 50 °C.
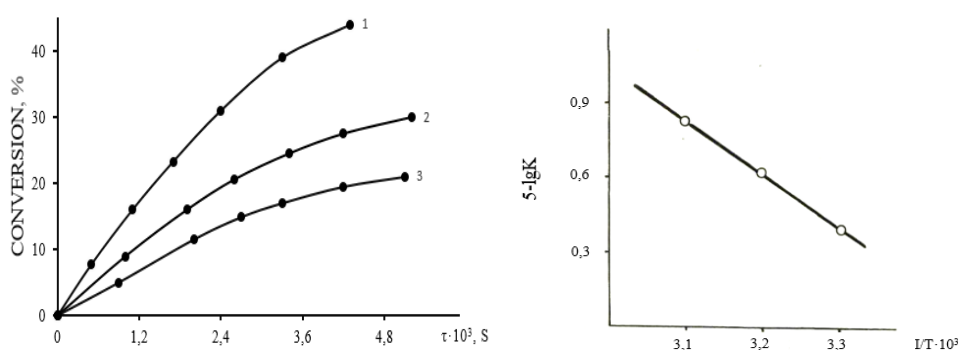

Figure 3 - Dependence of polymer yield on reaction time at temperatures: 1 - 30 ° C, 2 - 40 ° C, 3 - 50 ° C (a)and calculation of activation energy (b)

Perceivablefrom Figure 3a, with an increase in temperature, the rate of spontaneous polymerization increases.

The activation energy of the reaction of spontaneous polymerization of vinylbenzyl bromide with dimethylaniline, which is 38.25 kJ / mol, was determined from the dependence of the reaction rate constants on temperature in arrhenius coordinates (Fig. 3b). The value of K turned out to be close to the value of the activation energy, a characteristic Menshutkin reaction, which is the initial stage of the process. This suggests that the Menshutkin reaction is at the same time a limiting stage of the process. This is also confirmed when determining the order of reactions for the starting components.

Installed results of the study, it can be assumed

that, with the equimolar ratio of vinylbenzyl bromide to tertiary amine or with an excess of tertiary amine, polymerization is highly selective and whose mechanism, by analogy with the mechanism proposed in [89], includes three stages:

Based on the studies, it was shown that with an excess of tertiary amine, polymerization is highly selective and a mechanism is proposed that includes three stages:

− chemical activation as a result of salt formation;

− initiation by the formation of an intermediate zwitterions

− chain growth by the addition of a monomeric salt to a zwitterion and a growing chain.

To determine the reactivity of the selected monomers, we studied the processes of their copolymerization with acrylonitrile in the presence of various initiators and under different conditions.

As can be seen from the results obtained, the copolymerization rate in the presence of dicyclohexylperoxydicarbonate is greater than in the presence of benzoyl peroxide and dinitrileisobutyricacid. This, apparently, is explained by a higher decomposition rate of dicyclohexylperoxydicarbonate under the reaction conditions than benzoyl peroxide and dinitrileisobutyricacid.

Regardless of how, the high decay rate of the initiator leads to its rapid consumption and part of the free radicals at the same time reacts with growing macroradicals, which leads to a decrease in the molecular weight of the copolymers (table 2).

Table 2 - Effect of the nature of the initiator on the yield and intrinsic viscosity of the copolymers, $T = 600\,°C$; $[I] = 0.035$ mol / L; $[M] = 7.35$ mol / L.

Copolymer	The initial ratio of monomers, mol, %	Initiator	Liquid	Time, $1×10^{-3}$c	Output, %	$[\eta]$ dl / g
VB + AN	50:50	PB	DMFA	7,2	11,5	0,82
		DAK	DMFA	7,2	9,2	0,70
		DSPDK	DMFA	3,6	13,0	0,55
BC + AN	50:50	PB	DMFA	7,2	18,0	0,84
		DAK	DMFA	7,2	9,8	0,72
		DSPDK	DMFA	3,6	12,0	0,57
VBB + AN	50:50	PB	DMFA	7,2	10.3	0,22
		DAK	DMFA	7,2	14,5	0,20
		DSPDK	DMFA	3,6	16,8	0,15
VBA+AN	50:50	PB	DMFA	7,2	10,0	0,53
		DAK	DMFA	7,2	9.3	0,20
		DSPDK	In mass	3,6	11,5	0,18
AB + AN	5:95	PB	DMFA	7,2	16,8	0,15
		DAK	DMFA	7,2	9,0	0,26
		DAK	In mass	3,6	10,2	0,45

To study the influence of the nature of the medium on the copolymerization of bromine-containing monomers with acrylonitrile, the reaction was carried out in various solvents of different polarity. Studies have shown that the copolymerization reaction proceeds at a higher rate in the medium of dimethylformamide than ethanol and benzene. This, apparently, is explained by the fact that in a polar solvent medium (EDMFA>Vetanol>Ebenzene), the polarization of double bonds of polar monomers is enhanced, which increases their tendency to polymerization.

The influence of the structure of monomers on the activity of vinyl groups was also studied. The vinyl group of these monomers is not a rigidly fixed, strictly localized system, the cloud of π electrons of the double bond is mobile, dynamically covers all systems connected by conjugation. In vinyl bromide, the bromine atom is located directly at the double-bonded carbon, and the mutual influence of the double bond and the bromine atom is explained by the conjugation between the free bromine electrons and the double bond. As a result of this pairing, the carbon-bromine bond receives a doubly bound character. Thus, carbon and bromine are bound together by more than one pair of electrons and the carbon-bromine bond is stronger than if it were a purely simple bond.
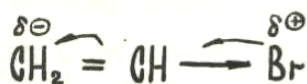
The dipole moment of the coupling decreases, since the induction component of the dipole moment and the much smaller moment arising due to the conjugation are directed in different directions [4]

In this structure, the bromine atom naturally carries a positive charge, and the carbon atom is negative. The induction effect of the bromine atom greatly reduces the electron density of the double bond, making it difficult to break the double bond.

In the bromstyrene molecule, the bromine atom is located directly at the carbon of the ashless ring and the mutual influence of the double bond, the benzene ring and the bromine atom is also explained by the conjugation between the free electrons of the bromine, benzene ring and the double bond. Therefore, the bond of bromine with carbon of the benzene ring becomes strong.

In allyl bromide, the bromine atom is very mobile, easily replaced. This is due to the high stability of the allyl radical due to the resonance effect. Each carbon - carbon bond in an allyl radical is neither double nor simple, but hybrid. A free electron is not localized on any of the carbons: it is delocalized, and it is equally distributed between two terminal carbon atoms:

The overlapping of the p-orbital with the π-cloud of the double bond leads to stabilization of the radical.

In vinylbenzyl bromide, the π-electrons of the vinyl group enter into conjugation with the π-electrons of the benzene ring (π_1, π-conjugation), which, apparently, reduces the double bond cleavage energy, and the presence of a methylene group increases the activity of the bromine atom. This is indicated by the calculated values of activation energy ($E_{BVB} = 86$ kJ / mol) and a relatively large value of specific activity ($Q_{BBB} = 0.326$) compared with vinyl bromide ($E_{BB} = 101.5$; $Q_{BB} = 0.038$).

In addition, the density of the C-Br bond electron cloud shifts to the more electron-negative bromine atom. As a result, bromine becomes mobile and participates in chain transfer reactions via the monomer and chain transfer constants increase in the order of SBB <SBB <SAB.

The above premises are confirmed by considering the quantum structure of these monomers [4]. As is known, the bromine atom is located directly at the double-bonded carbon and the carbon bearing the bromine atom has sp2 hybridization (rather than sp3), therefore the carbon-bromine bond is shorter and stronger (C – Br bond length 1.86 A0) and the

molecules are more stable (breaking energy of the C - Br bond is DVB = 292.6 kJ / mol), for allyl bromide and vinylbenzyl bromide the carbon-bromine bond is formed due to sp3 hybridization, the bond length is 1.91 A0 and therefore the C – Br bond is less stable (DBA = 196.6 kJ / mol, DBBB = 209.0 kJ / mol) [5].

Consequently, when studying the behavior of halogen-containing monomers in binary systems with amino compounds, the course of spontaneous polymerization of some bromine-containing monomers with an active halogen atom during interaction with tertiary amines was revealed.

Conclusion

When researching the kinetics of the copolymerization of bromine-containing monomers with acrylonitrile, as well as studying the mutual influence of the bromine atom and double bond in the monomers under study, it was shown that the presence of a reactive bromine atom greatly influences the copolymerization process and the properties of the resulting copolymers, which makes it possible to more purposefully but to carry out the synthesis of a number of macromolecular compounds, as well as their further chemical transformation.

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RUSSIAN LANGUAGE IN THE PARADIGM OF LANGUAGE EDUCATION IN MEDICAL UNIVERSITIES

Abstract: This article deals with the problems of teaching Russian as a specialty language in medical educational institutions of the Republic of Uzbekistan. Russian language for students of medical universities of Uzbekistan, on the one hand, means of obtaining a specialty, and on the other hand, a means of professional business communication. At present, the higher education system of the Republic of Uzbekistan is undergoing significant reforms that are being carried out with the aim of improving the quality of professional training of future specialists, mastering them with highly professional qualifications, and developing stress resistance and competitiveness. "Russian language", which is a subject in the block of humanitarian and natural sciences in medical higher educational institutions of the republic, as a language of specialty allows physicians to carry out their professional activities when working with the Russian-speaking population of Uzbekistan. The effectiveness of communication in the field of medical professional activity depends on the degree of proficiency of future doctors with language knowledge, skills in Russian in the educational, scientific, professional, social and cultural spheres of future life. Teaching Russian to students of medical universities should be professionally oriented and integrative (interdisciplinary), implemented through the cooperation of teachers of the Russian language with teachers in their specialty, taking into account the motivation of students and requirements for graduates of medical schools.

Key words: medicine, network technologies, language, Russian language, specialty, competence, standard, education

Language: Russian

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РУССКИЙ ЯЗЫК В ПАРАДИГМЕ ЯЗЫКОВОГО ОБРАЗОВАНИЯ В МЕДИЦИНСКИХ ВУЗАХ

Аннотация: В настоящей статье речь идет о проблемах обучения русскому языку как языку специальности в медицинских образовательных учреждениях Республики Узбекистан. Русский язык для студентов медицинских вузов Узбекистана является, с одной стороны, средством получения специальности, а с другой стороны – средством профессионального делового общения. В настоящее время система высшего образования Республики Узбекистан претерпевает значительные реформы, которые проводятся с целью улучшения качества профессиональной подготовки будущих специалистов,овладения ими высокопрофессиональной квалифицированностью, формирования стрессоустойчивости и конкурентоспособности.«Русский язык», который является учебным предметом в блоке гуманитарных и естественнонаучных дисциплин в медицинских высших образовательных учреждениях республики, в качестве языка специальности позволяет медикам осуществлять свою профессиональную деятельность при работе с русскоязычным населением Узбекистана. Эффективность коммуникации в сфере медицинской профессиональной деятельности зависит от степени владения будущих медиков языковыми знаниями, навыками и умениями на русском языке в учебно-научной, профессиональной, социально-культурной сферах будущей жизнедеятельности. Обучение русскому языку студентов медицинских вузов должно носить

профессионально-ориентированную и интеграционную (междисциплинарную) направленность, реализовываться через сотрудничество преподавателей русского языка с преподавателями по специальности, с учетом мотивации студентов и требований к выпускникам медицинских вузов.

Ключевые слова: медицина, сетевые технологии, язык, русский язык, специальность, компетенция, стандарт, образование.

Введение

Спецификой обучения русскому языку в вузах нефилологического направления, в частности в медицинских высших образовательных учреждениях, является то, что особую ценность приобретает не столько знание языка как такового, сколько умение применять его в процессе речевого профессионального общения с пациентами, их близкими и родственниками, и потомусформированная речь выпускника вуза – это один из важнейших показателей готовности и способности осуществлять профессиональную деятельность. В основе обучения русскому языку студентов-медиков, таким образом, лежит профессиональная направленность.

Языковое образование в Узбекистане, обусловленное происходящими в обществе социально-экономическими преобразованиями, имеет специфику – оно базировано на привитии обучающимся посредством языка национальной идеологии, духовно-нравственных ценностей, сформированных многовековой историей, традициями и обычаями народа. Естественно, что при обучении иностранным языкам неизбежен контакт языков, а значит – и репрезентируемых ими культур, проникновение чужеродных идей в информационно-воспитательное пространство подрастающей молодежи. В связи с этим в языковом образовании в республике остро стоит вопрос выработки у молодого поколения устойчивого иммунитета против наплыва деградационной, дезориентирующей информации.

Традиционно в научной литературе под термином *язык специальности* понимается прежде всего профессиональная лексика, в частности совокупность профессиональных терминов и терминологических сочетаний, а также относящиеся к сфере профессиональной деятельности фразеологические единицы, пословицы и поговорки. Поэтому обучение языку специальности сводится к обучению терминам и паремиологическим единицам языка по специальности.

Иначе говоря, в процессе обучения триаде *знания – навыки – умения* происходит перекос в сторону подачи знаний, а проблема формирования навыков и умений остается в стороне. В итоге обучающиеся овладевают набором необходимых знаний о терминах и других профессионально окрашенных языковых единицах, но не могут их эффективно применять в процессе своей профессиональной деятельности.

Мы видим причину нерезультативности обучения языку специальности при приравнивании его к овладению набором профессионально окрашенных языковых средств в том, что при таком подходе обучение осуществляется лишь на уровне формирования лингвистической компетенции, в отрыве от прагматического, социолингвистического, социокультурного и других компонентов профессиональных компетенций.

Таким образом, можем утверждать, что обучение студентов медицинских вузов языку специальности на русском языке как компоненту профессиональной речи считается эффективным только при условии сформированности навыков и умений его применения непосредственно в сфере профессиональной деятельности.

Русский язык студентами медицинских вузов Узбекистана востребован и в качестве средства получения специальности, и в качестве средства профессионального делового общения.

Literature review

При обучению русскому языку студентов-медиков преследуется цель обеспечения возможности эффективной коммуникации в сфере медицинской профессиональной деятельности. Основной упор делается на приобретение студентами языковых знаний, навыков и умений на русском языке в учебно-научной, профессиональной, социально-культурной сферах будущей жизнедеятельности.

«Любой специалист любого уровня не состоится, если он не использует печатные источники на иностранном языке, Интернет, не контактирует со специалистами в данной профессиональной сфере»[2, p. 9]. В связи с этим, обучение русскому языку в медицинских высших образовательных учреждениях Узбекистана как предмету с большим учебно-воспитательным потенциалом характеризуется, согласно учебно-нормативным документам, нацеленностью на формирование у студентов профессионально-коммуникативной компетенции на данном языке. Особенно возрастает роль русского языка в связи с создавшейся в республике социолингвистической ситуацией, в которой, с одной стороны, русский язык является вторым языком для многих граждан-узбеков, в частности городского населения, а с другой стороны, он выполняет роль родного языка некоторых национальных меньшинств (местных корейцев,

татар, немцев, украинцев, казахов и др.), и с третьей стороны, русский язык продолжает выполнять функцию языка международного, межнационального общения при контактировании местного населения с гражданами стран СНГ и некоторых других государств.

Представляется вполне правомерным в таких условиях функционирования русского языка в Республике Узбекистан неуклонный рост его роли в становлении личности будущего специалиста-медика, в формировании профессионально-коммуникативной компетенции. Тем не менее, следует признать, проблема формирования профессионально-коммуникативной компетенции у студентов – будущих медиков на русском языке, несмотря на свою злободневность, остается в лингвометодическом плане все еще нерешенной, создавая некий пробел в языковом образовании страны в области преподавания русского языка в высших образовательных учреждениях нефилологического направления.

Традиционно в научной литературе под термином *язык специальности* понимается прежде всего профессиональная лексика, в частности совокупность профессиональных терминов и терминологических сочетаний, а также относящиеся к сфере профессиональной деятельности фразеологические единицы, пословицы и поговорки. Поэтому обучение языку специальности сводится к обучению терминам и паремиологическим единицам языка по специальности.

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Профессиональная направленность обучения русскому языку в медицинских высших образовательных учреждениях Узбекистана продиктована все возрастающим спросом и интересом к овладению им и со стороны самих обучающихся, продиктованным открытием широкого доступа к разнообразной учебной и профессиональной литературе в настоящее время в связи с развитием информационно-компьютерных технологий. С другой стороны, меняется парадигма общения, когда «радикальное и стремительное изменение социальной жизни нашей страны, открытие границ и вхождение в мировое сообщество, рост научно-технических средств связи сделало языки реальным средством общения между представителями самых разных культур»[1].

На сегодняшний день в Узбекистане знание иностранного, в том числе и русского языка есть одно из непреложных условий, предъявляемых как к знаниям, так и к личности специалиста в целом. В формировании личности специалиста как конкурентоспособного профессионала своего дела владению русским языком отводится значительное место.

Следует отметить, что подход к обучению русскому языку в медицинских высших образовательных учреждениях Узбекистана меняется. В приоритете оказывается прежде всего обучение русскоязычному общению с невладеющими узбекским языком пациентами, их близкими и родственниками, а также овладение языком как одним из инструментов повышения научных профессиональных знаний и опыта.

В основе языкового образования Республики Узбекистан по-прежнему лежит мотивационный подход, согласно которому эффективность обучения как родному (узбекскому), так и неродному (русскому) и иностранным (английскому, немецкому, французскому, испанскому, китайскому и многим другим) языкам напрямую зависит от умения преподавателя-предметника повышать мотивацию студентов к осознанному овладению языком и глубокому пониманию его значимости в профессиональной подготовке специалиста, постоянно поддерживать познавательный интерес к языковой учебной дисциплине.

В методике обучения языкам мотивационный подход всегда ставился во главу угла и считался основным условием обеспечения успешной результативности учебно-образовательного процесса. Следует отметить, что современное общество и развитие новых технологий навязывают предметникам поиски новых методических приемов развития интереса у студентов к изучению языков, основанных, с одной стороны, на отличном знании своего предмета, с другой стороны, интеграции языковых

учебных дисциплин с другими, как по блоку специальности, так и остальными.

Интеграции русского языка как учебной дисциплины с дисциплинами по специальности предопределяет:

1) взаимосвязь функционально-структурных элементов системы профессионально ориентированного обучения;

2) создание новых междисциплинарных направлений;

3) создание интегративной модели профессионально ориентированного обучения, нацеленной на формирование различных составляющих коммуникативной компетенции и вбирающей в себя «цикл взаимосвязанных дисциплин, аспектов, которые, органично дополняя друг друга по модульному принципу, позволяют получить на выходе грамотного специалиста, знания и умения которого полностью отвечают требованиям современного мира», что, в конечном итоге, обеспечивает целостность и системность лингвообразовательного процесса[11, p. 79].

Интеграция учебных дисциплин всех блоков обучения в процессе преподавания русскому языку в медицинских высших образовательных учреждениях Узбекистана позволит в рамках реализации «Государственногообразовательного стандарта системы непрерывного образования Республики Узбекистан»[6] решить проблемы мотивации к овладению русским языком путем:

1) создания аутентичной среды обучения, поскольку, как показывает горький опыт прошлого, обучение языкам в искусственной языковой среде или ее отсутствие тормозит процесс овладения изучаемым языком и отрицательно сказывается на качестве владения им;

2) повышения статуса русского языка как общеобразовательной учебной дисциплины, традиционно воспринимаемой в медицинских высших образовательных учреждениях как второстепенный предмет;

3) профессионально ориентированного обучения русскому языку как важному компоненту формирования и развития профессионально-коммуникативной компетенции будущих специалистов-медиков;

4) информатизации образовательного процесса.

Всем известно, что реформы в сфере образования на всех уровнях в Узбекистане в целом и в системе высшей школы в частности предусматривают информатизацию образовательного процесса, что порождает необходимость овладения азами информационно-компьютерной грамотности как обучающим педагогическим персоналом, так и самими обучающимися.

Всем известно, что реформы в сфере образования на всех уровнях в Узбекистане в целом и в системе высшей школы в частности предусматривают информатизацию образовательного процесса, что порождает необходимость овладения азами информационно-компьютерной грамотности как обучающим педагогическим персоналом, так и самими обучающимися.

К сожалению, на сегодняшний день, несмотря на то, что роль обучения языку в формировании, развитии и совершенствовании профессионально-коммуникативной компетенции будущих медиков является общепризнанной, отсутствуют фундаментальные исследования эффективных путей и методов обучения профессиональной направленности студентов медицинских высших образовательных учреждений Узбекистана при помощи инновационных информацинно-компьютерных технологий в процессе преподавания как русского, так и других языков.

Как пишет Н.А. Серегина, в процессе обучения русскому языку в медицинских высших образовательных учреждениях необходимо ознакомить студентов «с различными источниками профессиональных знаний в области медицины, которые доступны на русском языке: учебники, конспекты, справочники, энциклопедии, интернет-ресурсы различного назначения в области медицины и здоровья. При этом попутно встает задача овладения необходимым лексическим минимумом и сопутствующими навыками поиска и систематизации информации, которые способствуют повышению их профессионального уровня»[12, p. 208-212]

Решение этой задачи осложняется в условиях Узбекистана следующими обстоятельствами:

1) неунифицированностью нормативно-правовой основы языкового образования в республике, в частности, отсутствием преемственности в обучении русскому языку в дошкольном, школьном и вузовском образовании;

2) несоответствием фактического уровня языковой подготовленности студента на русском языке установленным в учебно-нормативной литературе стандартам;

3) отсутствием учебников и учебных пособий, отвечающих современным требованиям к содержанию обучения иностранным языкам;

4) недостаточной компетентностью предметников-русистов в профессиональной направленности языка специальности медиков;

5) недостаточной сформированностью информационно-компьютерной компетенции преподавателя русского языка;

6) зачастую неаутентичностью используемого учебного материала;

7) недостаточной степенью владения профессорско-преподавательским составом медицинских высших образовательных учреждений инновационными педагогическими технологиями преподавания на занятиях по русскому языку и их применения; и др.

Естественно, что несмотря на наличие ряда проблем, связанных с уровнем довузовской подготовленности студентов по русскому языку, что характерно не только медицинским, но и высшим образовательным учреждениям почти всех профилей в республике, обучение русскому языку в медицинских вузах должно быть направлено, наряду с формированием знаний специально (профессионально) окрашенной системы языковых единиц и сведений об их функционировании в речи, на привитие навыков и умений самостоятельной работы, мотивационного отношения к овладению знаниями, творческого поиска решения профессиональных проблем в научно-медицинской литературе на русском языке, что выступает в настоящее время гарантом повышения качества подготовки медицинских работников.

Русский язык, таким образом, в парадигме языкового образования в медицинских вузах Узбекистана должен выполнять функцию не только средства осуществления профессиональной деятельности, но и функцию средства приобретения специальных, медицинских, знаний.

Results and conclusions

Русский язык в Узбекистане преподается как неродной во всех образовательных учреждениях, в том числе и в медицинских вузах. Тем не менее, в преподавании русского языка студентам нефилологических вузов республики встречаются те же проблемы, что и в обучении ему в статусе иностранного языка.

Профессионально-коммуникативные неудачи в медицинской профессиональной деятельности связаны не сколько с недостаточным владением специалистами профессиональных знаний непосредственно по своей специальности, а сколько их профессионально-коммуникативными и духовно-личностными компетентностными качествами, формированию и развитию которых, на наш взгляд, необходимо уделять пристальное внимание и при профессионально-ориентированном обучении студентовмедицинских вузов русскому языку как неродному/иностранному.

Проблема формирования и развития профессионально-коммуникативных и духовно-личностных компетентностных качеств у студентов-медиков является особо актуальной в преподавании русского языка как неродногов медицинских вуза Узбекистана, поскольку национально-культурными традициями узбекского и других народов, проживающих на территории республики, исторически заложено проявление уважения, сострадательности, толерантного отношения к собеседнику, в особенности к социально и физически уязвимым людям: детям, старикам, больным, инвалидам и др.

Межличностная коммуникация есть неотъемлемая часть профессиональной деятельности врачей. При некорректном установлении межличностного контакта врач несет ответственность не только за правильность поставленного диагноза и назначенного лечения, но и прежде всего за свое профессиональное речевое поведение.

В целом, проблемы профессионально-ориентированного обучения русскому языку как неродному в медицинских высших образовательных учреждениях Узбекистана можно объединить в группы, связанные с формированием языковой личности будущего специалиста; формированиеми развитием профессиональной компетенции студента-медика на русском языке; дидактическим обеспечением профессионально-ориентированного обучения русскому языку; интеграцией курса русского языка с учебными дисциплинами по специальности студентов-медиков; социокультурным аспектом профессионально-ориентированного обучения русскому языку русского языка в Узбекистане.

Обозначенные и им подобные проблемы требуют поиска наиболее эффективных подходов, которые способствуют развитию у студентов медицинского вуза творческих способностей и клинического мышления, в том числе и на русском языке. Профессионально-ориентированная направленность обучения русскому языку студентов медицинских вузов должна реализовыватьсяпутем интеграционных, междисциплинарных связей через сотрудничество преподавателей русского языка с преподавателями по специальности, с учетом мотивации студентов и требований к выпускникам медицинских вузов.

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IMPLEMENTATION OF NEW MANAGERIAL TOOLS FOR COMPANY'S MANAGEMENT DEVELOPMENT

Abstract: *This article presents the details of the new management techniques and managerial tools implementation and the results of their implementing new in the context of the management system development which is carried out in the large Uzbek manufacturing company "GM Uzbekistan". Analysis of the results of innovation activity, questionnaire survey and special interview reveals of main influenced factors. Result of the research illustrates the importance of in-company culture and managerial style, empowerment and involvement of personnel, education and training programs.*

Key words: *management development, improvement team, managerial tools, innovation, implementation.*

Language: *English*

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Introduction

Globalization processes puts pressure on companies to improve their efficiency in a continuous way. Main part of effective company are modern management, there has been increasing awareness and implementation new Managerial tools and techniques in context development the management of company. Especially ones need for Uzbek automobile manufacturing companies.

Many companies of developed countries learnt that the effective management means implementation of the Employees Suggestion System (ESS), Quality Circle (QC) activity, Total Productive Maintenance (TPM), Management by objectives (MBO) that increased of productivity and efficiency, let to save lot of money, and improved of quality. Hyland *et al.* (2004) highlights the major potential benefits of these tools as are both as increase business performance so increase "people performance" in the form of personal development [1]. This aspect of new managerial tools is very important for developing countries and Uzbekistan. Verdinejad *et al.* (2010) demonstrate the application of these tools in model of large Iranian holding development [7].

Companies' of Uzbekistan, which want become the industrial country and develops the new branches

of industry as automotive manufacturing, also tried to implement new effective technique of CI.

Today productivity of Uzbek workers is considerably low by international standards, triggering the need to enable and motivate Uzbek workers to actively participate in development of production and increasing its effectiveness. In this regard, implementation new methods and techniques is very important as form of Action learning and needs fundamental change in company's culture through people development [6].

There are some important reasons of that (on our opinion common for industrial companies of the every developing country):

1. Shortage of all kinds resources,
2. Low level of education and training of employees;
3. Lack of discipline and low morale of workers;
4. Low level of organizational culture and management skills [8].

As well as certain characteristics of workforce not encourage employees' involvement, initiative and empowerment. According to above mentioned, key issues for implementing CI in developing country's company is selection of the kinds of managerial

techniques that are more effective in local culture's conditions.

II. The Company development concept

"GM-Uzbekistan" (Asaka, Uzbekistan) was a Joint-venture company, since 2007 forms part of USA-owned multi-national corporation General Motors and began independently operated as national automaker company in 2019.

The company manufactures the several models of passenger cars and the micro-buses. The production site was opened in 1996 and was Uzbek-Korean owned Joint-Venture until the jointed to family GM. There are more than 10000 employees at this site and at the three other Uzbekistan sites.

About twenty years ago, company launched a program focused on integrating the organization's Mission, Vision and Values into the work and culture of the organization. The program, led by the company's top management, was adopted because of the belief that strong innovative policy can lead to greater employee engagement and better organizational outcome. The management of the company made-out the following concept of company development (fig.1).

Under the Vision of company's future, the Mission was stressed that improving of quality of the Human resources and involvement through Paradigm changes should be used to create the Learning organization and climate of the Continuous Improvement. The Suggestion system, Education and Training, Quality circle, 5S' and TPM activity were selected as main tools for stirring up of employees.

Successful implementation of development model of the company greatly depends on consciousness of the personnel of the company. Only increasing the level of personnel consciousness, will it be possible to achieve targets set and utilize all opportunities available in developing company. It would be interesting to learn how this company aligns Quality of management to Human resources development through Continuous Improvement as the part of development strategy.
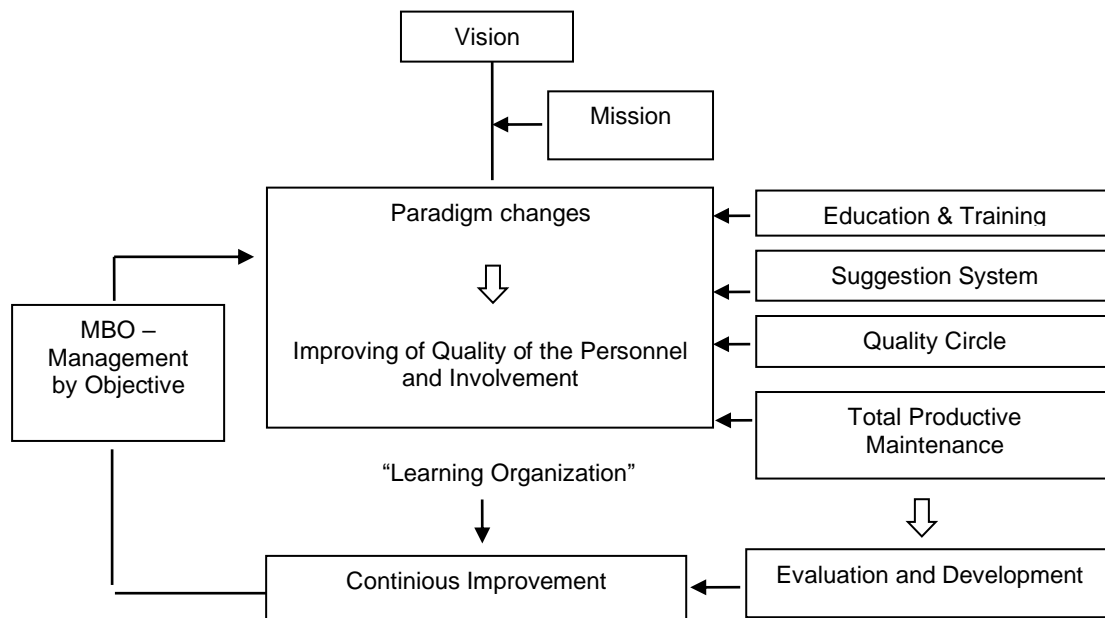

Figure 1: Concept of company development

III. Implementation of innovation activity in the company

The goal of program during the first years was simply Paradigms change awareness. All employees received four-hourly training on the company's organizational development concept and new managerial improvement techniques, and the training was incorporated into new employee and manager orientation.

A survey of employees following these trainings showed that the trainings were effective in increasing awareness of company's organizational development concept and developing new demands to workforce.

For developing the innovation activity and promotion of implementing a new techniques company management established special Cross-functional Innovation (Implementation) team included seven high-qualified and high-motivated specialists. The Innovation team was educated and trained by company's top management and empowered for

effective activity. As a result of this experimental phase it became clear that introducing any approach would require expert guidance and support, i.e. establishing special Innovation team.

The second of the program focused on engagement. The management (personally - 1st Deputy General Director from Korea) and Innovation team developed several tools for managers to increase the focus on Organizational development within their departments and to foster an environment in which the values would flourish.

Specifically, managers were instructed on how to establish goals for employees that align with the organization's using MBO – Management by objectives and to incorporate MBO method into the performance reviews.

The goal of the third phase of the program was adoption. Each month, the Innovation team developed events and programs that focused on a different core value of the organization and its divisions. For example, "OK rate" of production line as final determinants that shows effectiveness of production and quality.

By this way company' Management through Innovation team activity arranged employee's activity and main goals of company. The program is constantly overseen by a company's top management and two positions were added to support the project. Progress of the program is tracked through a periodic, usually monthly reporting of every divisions of the company. Leaders of the company offered three recommendations for implementing the program at site:

1. Engage senior executives. Grassroots activities are important, but rolling them out and maintaining them organization-wide requires high-level support and initiatives.
2. Coordinate timing so that the initiative does not conflict with other significant efforts.
3. Slow and steady wins the race. Incremental change brings small steps that lead to steady progress.

Below shows the list of managerial innovative techniques that was implemented in company (Tabl.1).

Table 1. Results of organizational innovations in company

Innovation	Period	Initiator	Mover/Driver	Result or status
5"S"	2000 – present	Management of company	Innovation team	Routinized
MBO- Management by objective (changed by GMS)	2000-2008	Management of company	Innovation team	Passing to GM-GMS
Suggestion system	2000-present	Management of company	Innovation team	Developed actively
Quality circle	2001-present	Management of company	Innovation team	Routinized /Stagnation
TPM – Total Productive Maintenance	2002-2015	Management of company	Innovation team	Fading
Production system GM-GMS	2009-present	Management of company	GMS Team	Developed actively
Focusing Improvement Team	2012- present	Management of company	Innovation team	Actively developed

Lack of managerial support and mass enthusiasm were reasons of unsuccessful in the first trying to establish and develop Suggestion system and Quality circle. These early attempts did not however bring their fruits as expected, but constituted learning process in planting suggestion system and small group activities in plant. Total productive management also has not developed through shortage of the mass enthusiasm of employees and special national character features, and it is fading to 2015.

The Employees Suggestion System and Quality circle activity as most developed managerial technique and as main Continuous Improvement tools was selected for more detail analysis.

IV. The Suggestion System

Suggestion systems are important features of Continuous Improvement program everywhere. Many companies with developed suggestion systems have shown the importance of improvement in quality and quantity of production. There has been little empirical research on the issue of suggestions in companies of developing countries. [3].

While there have been studies about modern production systems, there has been little specific focus on suggestion systems in aspects of employees development. For this reason, we conducted research on the "human side" of suggestion system in company that established a well-organized suggestion system. Research has found that Employees Suggestion System is a useful way to obtain and utilize

employee's creative ideas. To be effective, employees must be motivated to participate in the Suggestion system.

The Suggestion System operated by the General Motors Uzbekistan generated over 90 thousand suggestions for improving manufacturing processes over a span of 10 years, including suggestions both of individuals – as each employee Ideas and of Quality circles – as group decision making. The average number of suggestions submitted by each employee per year is 2.1, that approximately similar as 10 years ago for Britain companies [5]. The saving from suggestions in the company was approximately 3.9 billion Uzbek sums (approximately US$ 2.530.000).

The table 2 shows the resulting performance of system at the company.

Table 2. Suggestion system development stages

Contents	Introduction (1998~2001)	Diffusion (2001~2006)	Activation (2007-2012)	Quality seeking (2013~ present)
Suggestion per person	0.03	1.1	2.0	2.1
Implementation rate, %	52.2	16.4	41.4	66. 9
Involvement Rate, %	5.8	48.4	60.2	82.7

As shown in the Table 2, four stages were identified: 1) introduction, 2) diffusion, 3) activation and 4) quality-seeking stages. The average number of suggestion increased to 11 486 in Activation stage and dropped to 11 172 Quality seeking stage, because the evaluation level for adoption was raised. Regardless, the average number of suggestions per person rather went up.

In view of the 66.9% implementation of the adopted suggestions which is compared with 41.4% in the previous stage, and 82.7% involvement which is compared with 60.2% in the previous stage. This indicates the company began to enter the qualitative approach from the quantitative one's.

The characteristics of each stage in the development of suggestion system are shown in the following figure.

Table 3. Main characteristics of Suggestion system Development Stages

Stage	Characteristics
Introduction (2001~2006)	- establishing the Education center of company; - training on real-life examples for middle-range and front-line managers; - introduction of Suggestion System basically.
Diffusion (2006~2009)	- establishment of rewarding system for implementation; - establishment of Suggestion Secretariat and Award Committee; - started Quality Circle conferences.
Activation (2009-2012)	- active implementation of Suggestion System; - computerization of Suggestion System management.
Quality seeking (2013~present)	- developing new form of group decision making – Quality Improvement Team; - standardization of evaluation processes; - expansion of suggestion system to suppliers.

V. Empowerment Practices in Action

Company top management strong supports of Continuous Improvement activity. In the beginning phase the company has the Innovation team include 7-9 permanent paid high qualified best employees as facilitators. These facilitators oversee about 12000 improvement events per year within the organization.

Front-line managers and person-in charge for Suggestion activity work together on the Innovation team, which helps to provide suggestion making activity within the different departments.

Front-line managers was to find as person-in charge for Suggestion activity to be empowering because they serve as a driver for expressing ideas, writing Improvement suggestions and implementing change.

Every year about two thousands employees received additional training on Suggestion activity. The company management reviews monthly reports on Suggestion activity progress. Survey of employee engagement at company shows that employees who are involved in suggestion-making activity (approximately 82,7%) are more engaged than those

who have not participated (17,3%). The company estimates that it has saved over 4 6178 millions soums (approximately 2,530 thousands USD) through improvements resulting from applications of suggestion system since the inception of the program.

VI. Effective Factors of Suggestion System

One of the aims of this paper was investigating effective factors in operating Continuous Improvement at the company. In order to conduct the research, an experience of the company was excavated in search of its characteristics in the suggestion system. Further, a questionnaire survey was conducted from 144 workers (best suggestion-makers, person in charge for suggestions, team members, etc.) in order to investigate what they think about the system and problems of system.

Relevant data was obtained and then analyzed for study (Table 5).

Main findings is the next.

1. Suggestion system activity is result firstly of managerial stress, secondly of busting the job demands.
2. Group suggestions is not much more effective than individual.
3. Suggestion system must be developed through improving the speed of evaluation and by using more simple procedure of evaluation.
4. For better motivating of suggestion-makers rewarding amount of money must be extend.

Some other quantitative finding by special interviews with best suggestion-maker workers includes following.

1. Just 40% of employees think their senior management really support new ideas and new ways of doing things.
2. Just 36 % of employees think senior management tries to be visible and accessible to employees.
3. A 42 % of employees think company's employee suggestion system is ineffective.

Table 4. Results of CI factors estimation

Factors affecting on innovation activity	Strongly disagree	Disagree	Middle	Agree	Stronly agree	Total	Mean	Std.deviation
Suggestions are result of the busting the job demands	6 (4,2)	21 (14,6)	55 (38,2)	21 (14,6)	14 (9,7)	144	3,465	1,17
Suggestions are result of managerial stress	4 (2,7)	10 (6,9)	28 (19,4)	41 (28,4)	61 (42,1)	144	3,965	1,09
Suggestions are result of employee involvement and development	16 (11,1)	15 (10,4)	53 (36,8)	38 (26,3)	22 (15,3)	144	3,257	1,18
Suggestions are result of "Shijoat" movement	2 (1,3)	69 (47,9)	47 (32,6)	20 (13,9)	6 (4,2)	144	2,729	0,89
Lack of support of front-line managers and innovation team	13 (9,0)	19 (13,2)	52 (36,1)	28 (19,4)	32 (22,2)	144	3,326	1,21
Importance of training and education for suggestion-making development	8 (5,5)	13 (9,2)	31 (21,5)	49 (34,0)	43 (29,8)	144	3,736	1,14
Group suggestions are more effective than individual	26 (18,0)	33 (22,9)	41 (28,4)	17 (11,8)	27 (18,8)	144	2,902	1,35
Speed of evaluation and rewarding is good	31 (8,3)	41 (28,4)	37 (25,6)	26 (18,0)	9 (6,2)	144	2,590	1,19
Procedure of evaluation is simple and convenient	29 (20,1)	44 (30,5)	25 (17,3)	31 (21,5)	15 (10,4)	144	2,715	1,29
Rewarding amount is not enough to motivate suggestion-making	8 (5,6)	28 (19,4)	21 (14,6)	28 (19,4)	61 (42,3)	144	3,708	1,32

6.1. Strong support of top management

Top management strongly and visibly supports the development of the suggestion system. Until last year, to solicit a suggestion from employees, any reasonable suggestion had been welcome so that data could be accumulated in a large quantity. The goal was to develop employee's capabilities to create new idea, to generate ability to make suggestions through receiving a new knowledge and skills. As a most of employees has received experience of suggestion-making, quantitative approach was encouraged by top

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management and factory turned to qualitative approach in 2010-2012.

Top management, as a main driving force, urges employees to participate in the training program and contributed to the integration of the Suggestion system through rewarding system and feedback.

6.2. Involvement and personal development.

On employee's viewpoint, suggestion making itself is important part of his worklife and important for company activity. Also, employees who feel a high level of accomplishment from the job would more suggestions and involvement is an important input to make a suggestion.

6.3. Participation

As mentioned previously, employees have extensively been involved in the suggestion process and successful suggestion system is a result of employee involvement practices. This company actively supports employee involvement, with a participation rate of 82.7% of total workers so that can reap organizational creativity. Subordinates are strongly encouraged to learn how to make suggestions by individual and group. An atmosphere of participation encouraged regarding a suggestion.

6.4. Evaluation procedure

The Suggestion system in company has been developed in a manner that employees actively participated in suggestion implementation and can see the current status of the submitted suggestion. The procedure of evaluation is simple, speedy and convenient to participants. The results of final decision are quickly disclosed regarding implementation. The generalization of the above mentioned opinions of employees about Suggestion system and its acted factors for personnel indicates in the figure 2.

Thus, based on results of this study, we can say - for Quality of management in context improving the company outer performance may be rise by implementing of new managerial tools both as Continuous improvement and as Personnel development tool. Effective implementation of these personnel-based possible in the next conditions:

1. messages to personal regarding who is invited to participate must be clear (in principle – all employees);

2. education and training are very important in the first phase of system development;

3. rewarding procedure must be suitable and clear for all employees; especially for engineers and operators

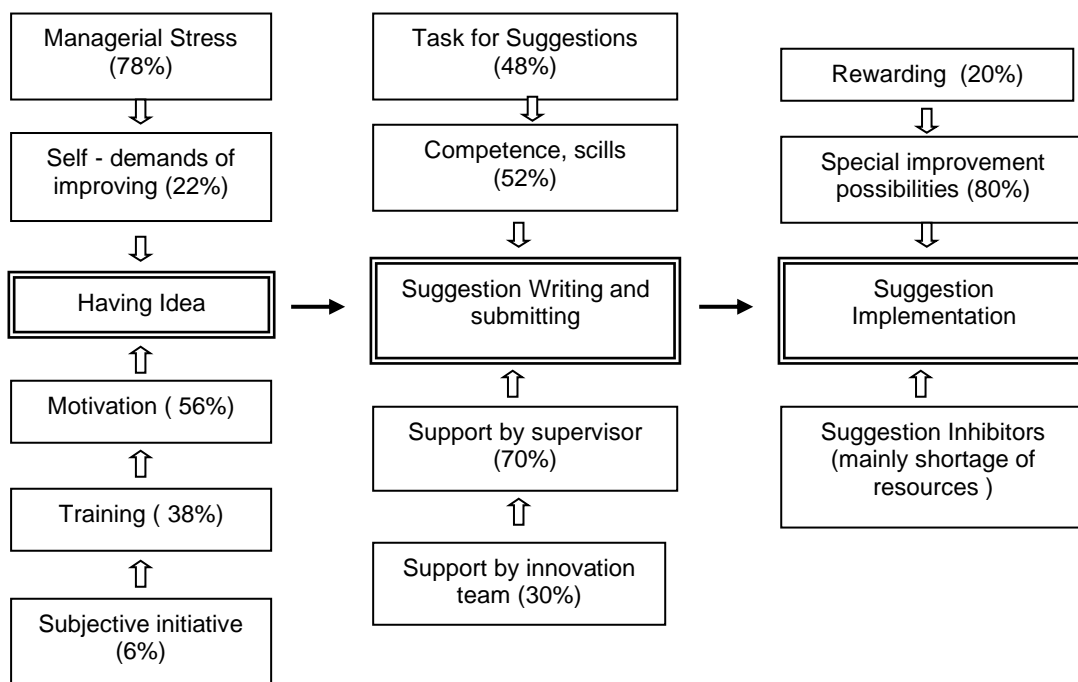4. Continuous improvement needs in continuous support for system.

Figure 2. Structure of suggestion system factors

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Conclusion

The management of the JVC "General Motors Uzbekistan" has actively tried to induce Continuous Improvement activity within company employees. Within the framework of the visions of the Continuous Improvement a common understanding has developed and the future direction of development has been negotiated.

The role of the management has been that of a driver and conductor in the Continuous Improvement process. This strategy has enabled the management to influence the development of employees with relatively limited resources.

The development of Continuous Improvement tools as Employees Suggestion System and role played by the decision-making groups as Quality circles and Improvement teams, indicates that managerial support, including training and employees development program are important. In our current conditions managerial stress is main motivator. In this process, employee's development has been equally important for the Continuous Improvement.

The history of Continuous Improvement in General Motors Uzbekistan demonstrates that success of new managerial techniques is not easy. The focus on the real problem areas, as quality, was, however, not a failure even though the targets were not met. The new managerial technology of human factor activating was later successfully utilized in the introduction of the focused Improvement team. The conclusion drawn from this is that management of company should, if possible, focus on collectivism aimed for real, vitally important areas and creative leaders.

This experience also shows that established Suggestion systems must be developed on basis of local living standards and national culture styles. Given the right environment and sensible managerial policy, it is possible to sharply developed Continuous Improvement activity in desired direction and to increase its efficiency.

Facilitating the Adoption of Continuous Improvement Tools

Findings from this experience and the literature review suggest that there are several actions that can facilitate the adoption of Continuous Improvement (CI). We offer the following recommendations for the adoption of CIs:

1. Commit to an organizational culture that focuses on quality and productivity. Use organizational culture for support that CI.

2. Engage leadership support. Ensure that top and middle level managers are involved in the implementation and developing of CI and that they reinforce the importance of CI for employees.

3. Involve the employees in strategic planning. Ensure that employees understand and sharing the Vision, Mission, Purpose and Goals of company.

4. Identify challenges and opportunities for employees learning and development. Make sure your company has a critical mass of professionals who have the training and experience to understand, implement, and evaluate these best practices.

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TAX SYSTEM OF UZBEKISTAN IN THE YEARS OF INDEPENDENCE: STAGES OF FORMATION AND DEVELOPMENT

Abstract: This article is devoted to the formation of the tax system of Uzbekistan in 1991-2019 and the stages of its improvement, during which one of the main factors of rapid development of the economy of our country is the implementation of the correct tax policy, the consistent continuation of the tax policy aimed at achieving these goals.

Key words: Tax, Budget, Tax Policy, Investment, Payment Systems, tax offices, tax code, tax burden, tax deduction.

Language: English

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Introduction

The tax system serves to generate revenue for the state and its territories, and to sustain the well-being of the country's population.

Since the first days of independence in Uzbekistan, much attention has been paid to creating an effective tax system and this issue is considered as the most important factor for ensuring the success of socio-economic reforms.

What is the tax itself? Taxes are mandatory fees charged to the state and local budgets at fixed rates from business entities and citizens. The introduction of taxes is directly related to the need to harmonize the financial base of state bodies, business activities, social development, protection of natural resources and the environment [1; p 107].

The collapse of the former Soviet Union with its hierarchically centralized state structure opened the way to the creation of a new economic system-a market economy and the creation of a cost-effective tax system [2, p. 112; 3, p.114].

The economic power of each independent state is generated by the state budget, which is formed on the basis of taxes, in particular its financial system. During the years of independence, the Republic of Uzbekistan was dictated by the liberalization of foreign economic activity and the state's stimulation of the functioning of the tax system as a state institution that contributes to

the achievement of these goals. Implementation of this task was difficult for young Uzbekistan.

As we know from history, the tax system of Uzbekistan has been functioning for almost 130 years as a small part of the Russian tax system. First, the main goal of the tax policy was to replenish the state Treasury for Russia, and then for the countries of the former Union. Only the Central government was given the authority to implement the tax system policy. There were no qualified personnel who would develop tax policy and lay the Foundation for the organization of the tax service.

Secondly, the future of our Republic depended to a certain extent on the correct functioning of the tax system. Tax policy in our country, it was necessary to introduce modern methods and principles of tax management, create an integrated system of tax authorities in accordance with market principles.

Third, tax policy was developed based on the common interests of this current period. Taking into account the socio-economic and demographic situation in the country, it was necessary to develop a tax policy based on the national public interest, clearly and comprehensively define its goals and objectives, and quickly abandon the method of "shock therapy", which could lead to severe economic and social consequences. From the first day of the state without experience in tax policy, where there will be a

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recession, where it will be possible to achieve success, it was necessary to solve such a serious issue.

From this point of view it is possible to divide the process of forming the system of tax authorities of the Republic of Uzbekistan into four stages:

The first stage of reforms: 1991-1997, the period of Uzbekistan aimed at creating its own independent tax system and increasing the Treasury value of taxes, developing a unified organizational basis for the tax system, adapting taxes to the requirements of the market economy and stimulating the production of enterprises.

In this regard, in Ukraine among the CIS countries, too, 1991-1995 was a period of formation and development of the state tax service [3].

Independent activity of tax authorities in the Republic of Uzbekistan after the adoption on June 14, 1991 of the Charter of the Supreme Council of the Republic of Uzbekistan "On state tax authorities of the Republic of Uzbekistan"and the resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 217 "On state tax authorities of the Republic of Uzbekistan" [4, p 163].

The status, basic functions, functions of the State tax service of the Republic of Uzbekistan and organizational basis of its activities established in accordance with the decree of the President of the Republic of Uzbekistan "on the transformation of the Main State tax service under the Cabinet of Ministers of the Republic of Uzbekistan, the State tax service of the Republic of Uzbekistan". Its activities are defined in accordance with the regulations of the Cabinet of Ministers of the Republic of Uzbekistan "About the state tax base of the Republic of Uzbekistan" approved by the decree of the Cabinet of Ministers of the Republic of Uzbekistan "On organization and functioning of the state tax base of the Republic of Uzbekistan", adopted in accordance with this resolution of the Cabinet of Ministers of the Republic of Uzbekistan, acknowledged that the State tax Inspectorate is a state control body in the implementation of tax and customs policy, as well as ensuring the protection of economic interests and property rights of the state [5; Д. 1. 4 в].

To imagine the difficult situation of that time, it is enough to remember that at the beginning of 1991, the state budget deficit of the Republic was formed due to caries. This, in turn, led to the need to create a legal framework for the Tax code aimed at reducing the state budget deficit and strengthening its revenue side [6; p 6].

The law" on taxes from enterprises, organizations and associations", adopted on February 15, 1991, became the first law in the formation of an independent tax system of the Republic. According to him, for the first time, the General principles of the structure and functioning of the tax system were defined, and the procedures for calculating and collecting taxes were established [7].

Since April 1, 1997, in order to further improve and strengthen the tax system of the Republic and regulate the accounting of taxpayers, the State tax administration has introduced a system for issuing and applying taxpayer identification numbers (TIN).

On April 24, 1997, Uzbekistan adopted the first tax code of the Republic of marotaba, which summarizes many documents that were previously used in practice. With the adoption of this document, the relations between taxpayers and tax authorities were settled. The tax code served as the knowledge of kengaitirishga taxpayers, and for tax officials, it became the only working document for effectively solving their tasks.

In July 1997, the NTC was allocated tax and customs duties, and the customs authorities were removed from the tax authorities and merged into a separate structure. The state customs administration of the Republic of Uzbekistan was created.

In accordance with the Law of the Republic of Uzbekistan "On the state tax service"of 29 August 1997 and the resolution of the Cabinet of Ministers of the Republic of Uzbekistan "on issues of organization of the State tax service of the Republic of Uzbekistan" of 12 January 1998, the main functions and functions of tax authorities are defined.

The transition from the old tax system that existed in Soviet times to the new system and its formation is a complex and contradictory process. This was the beginning of a period characterized by a gradual decline in production, on the one hand, a deepening of solvency, a decline in the standard of living of the population, and, on the other hand, the gradual introduction of market regulation, the replenishment of the market with goods and changes in inflation.

This stage is characterized by a decrease in production, high inflation, a deep mismatch of incomes and decline in living standards of population, reduction of unemployment, gradual degradation of culture, science, morality and crime.

The second stage of its reforms: it includes the period from 1998 to 2008. This period can be called a period of organizational and legal consolidation and development of the foundations of the tax system, the beginning of an important stage in the field of tax consolidation, comprehensive stimulation of economic entities, their support for activities, improvement of tax policy and liberalization.

For comparison, 2005-2006 in Ukraine was a period of strengthening the positive image of the state tax service.

At this stage, a simplified system for paying taxes to legal entities-taxpayers was introduced, their tax reporting was simplified, and tax payment deadlines were simplified.

Radical changes have taken place in the minds of the population, their way of thinking and worldview, formed on the principles of Communist and Soviet

ideology, have changed over the years. The tax burden that falls on the shoulders of manufacturing industries and enterprises is steadily decreasing from year to year.

And in in his report, I. Karimov noted that the Tax code adopted in 1997 does not meet today's priorities and requirements in the field of economic reforms. Over the past two years alone, more than a hundred changes and additions have been made to the tax legislation. The report recognized that the development of printing houses and approaches tested in practice in the field of taxation, the use of best practices of other countries in this regard is extremely important, and the tax system should not only be able to collect taxes, but also, first of all, encourage their application. [8; 89 б].

On this basis, the task was set to prepare the Tax code of the Republic of Uzbekistan in a new version based on the decree of the First President of the Republic of Uzbekistan dated January 7, 2005. To this end, law No. 136 "on approval of the Tax code of the Republic of Uzbekistan"was adopted on December 25, 2007. With this law, the new version of the tax code of the Republic of Uzbekistan was adopted and entered into force on January 1, 2008.

But in addition to the successes achieved at this stage, there were also drawbacks. Laws, decrees and regulations issued in most cases remain on paper, with obvious positive changes in the eyes.

The third stage of reforms: policies aimed at improving the tax system, facilitating and unifying the tax burden, simplifying and simplifying the tax system, reducing the tax burden, providing benefits on tax and other issues, and continuing the policy of providing tax benefits, including for 2009-2016. The introduction of interactive tax services involves the provision of tax and statistical reports in electronic form via the Internet.

However, the tax policy implemented in the country in the above three stages has not paid off.

For example, in the tax system rating "tax payments 2010", prepared by the world Bank in conjunction with Price Waterhouse Coopers, Uzbekistan ranked 178th out of 183 countries studied among countries ranked 174-183 in the list of the ten most complex countries of the tax regime.

For comparison, among the CIS and Baltic countries, the situation was as follows: Estonia-38, Latvia-45, Lithuania-51, Kazakhstan-52, Georgia-64, Moldova-101, Russia-103, Azerbaijan-108, Poland-151, Armenia-153, Kyrgyzstan-156, Tajikistan-162, Uzbekistan-178 and Ukraine - 181 places[9].

The fourth stage of reforms: 2017 was a period of historical changes in the tax policy of Uzbekistan. On the basis of a critical analysis of all issues, strict disciplinary and personally responsible measures were carried out. The tax base has expanded even more.

In 2017-2021, it is aimed at improving the

regulatory framework for reforms, ensuring the rule of law, and reforming all spheres of life of society and the state, including the tax sphere, which are identified as important tasks in the action strategy for the five priority areas of development of the Republic of Uzbekistan.

The current state of the tax system does not fully meet the requirements of a free market economy. Therefore, the introduction of modern information and communication technologies in the process of tax administration, the effective use of advanced foreign experience in this regard is of great importance.

The main idea of the new tax concept, introduced in 2019, is to reduce the tax burden, use a simple and stable tax system, reduce the tax burden, create more favorable conditions for doing business.the new amended Tax code provides for the promotion of honest taxpayers who are the mainstay of the country's development, while punishing those who do not pay taxes.

According to English expert Chris Welsh, in Britain, the tax and customs Committee is arranged in the same way: "the main task is to maintain the existing system and improve it, and not destroy it with further actions [10].

Continuing the policy of introducing the same fair tax regime for all by reducing the tax burden, the need for the gradual abolition of tax benefits, the abolition of taxes and other charges related to the minimum wage, the President of our country, Mr. President, said that the tax burden on the state budget of the Republic of Uzbekistan will be reduced.Mirziyoyev's merits became very great.

Reducing the tax burden and creating more favorable conditions for doing business is the only way to end the" hidden " economy. Therefore, we need to develop a separate program that provides for effective measures in this direction [11; 18 b] by President Sh. Mirziyoyev.

In fact, representatives of the new generation, who today think in a new way, see their future in connection with the strengthening of democratic values in society, the future of our country in connection with its integration into the world community, come to life.

And this is a reliable guarantee of the inevitability of reforms, the absence of backwardness of radical political, economic, spiritual and educational transformations in our country.

Thus, the first years of independence are characterized by high inflation, a crisis in mutual debts of enterprises, an increase in debt to the budget, a reduction in traditionally high tax procedures in the sector of former state-owned enterprises, and a lack of fair tax payment traditions.

One of the main factors for the rapid development of the economy in our country is the correct tax policy. The correct tax policy, however, provides a solution to such important economic and

social problems as reducing taxes as a result of economic development, improving the welfare of the population by increasing the volume of exports, increasing investment opportunities for legal entities and individuals, regulating export-import operations, and stabilizing the country's economy. Of course, this is a very complex and complex process, thanks to which such a result is achieved in one, two or short years. In this regard, our country is subject to consistent continuation of the tax policy aimed at achieving these goals.

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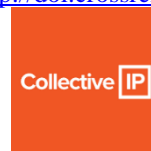
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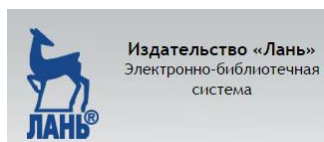
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