

STUDIES ON THE FUNCTIONS OF FOOTWEAR FOR CHILDREN

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Abstract: Children's footwear is meant to fulfill the physiological functions of the foot. The shape and internal dimensions of footwear, the material properties of the product from which is made, manufacturing technology etc., all influence children's feet and the comfort that they need. To get comfortable footwear is necessary to perform a correct choice of materials that are appropriate for shoes, rational design and execution of its corresponding technology. Purposes of personal use for current use or special particular conditions, modern shoes have multiple functions. Children's footwear perform several functions, which can be grouped in gnosiological functions, aesthetic features, ergonomics, comfort functions that ensures thermal resistance, providing psychological convenient functions. Establishing the correct number of functions and provide the manufacturer with them will get their suitable importance: reductions in production costs; simplify manufacturing processes; manufacturing cycle times; meet user requirements in greater measure.

Key words: Footwear, functions, children, classification, requirements.

1. INTRODUCTION

Children's footwear to the foot to fulfill its physiological functions. Shape and internal dimensions of footwear, material properties of the product is made, manufacturing technology and other factors influence children comfort they need. To make a comfortable footwear is necessary to perform a correct choice of materials that are structured shoes, rational design and execution of its corresponding technological [4].

2. FUNCTIONS OF FOOTWEAR FOR CHILDREN

Shoes have a large social utility, but all together is an individual, of each user, the affirmation of personality and a system for aesthetic values. Purpose of personal use for current use or special conditions particular, current shoes have multiple functions [4]. The main content of footwear function is man-made balance between the demands submitted by footwear and response to these requirements. Shoes expresses our goals, aspirations and preferences. Therefore, the position presents and confirms the artistic product of its image. For any items of footwear is important functional logic. With the development time changes, develops and improves functions, construction, form, rationality and argumentation usefulness of various types of footwear. At present various approaches to meet the presentation functions footwear, various authors differ footwear products following functions: utilitarian (practical), aesthetic, erotic, magical, social, moral, related to age, religious, professional, religious. Because shoes at the same time fulfills many functions, they are in a certain relation depending on its destination, one or more may be dominant (most important). Children's footwear, as that for adults, is meant to protect the human body actions weather (high and low temperatures, rain, snow, wind, dust) and various external mechanical action. Starting from the fact that shoes appeared in antiquity as a necessity to protect the feet of negative environmental actions can be said that the first function of the protective footwear was. At the same time it performs several functions, which in our view the functions can be grouped aesthetic, ergonomic features, functions thermo providing comfort, convenience features that provide psycho as presented below for shoes to children [1-5].

Protection function

1. Covering the body that expresses the product's ability to cover and protect the human body. Given the peculiarities of anatomy and biomechanics of the foot children in developing footwear construction for this consumer group option is recommended to those items that have a greater body coverage. We know that children are most active, so, shoes have to defend the various injuries such as scratches, bites, bruises, cuts, and the action of atmospheric agents used physical dust, moisture, excessive heat or cold excessive. In this respect, are recommended for children advantageous type boots or shoes.

Safe operating functions

2. The possibility of observing the wearer by others expressing the signaling capacity of user presence in the media or special situations. Children's footwear design is associated with notions of invention and innovation. Today we witness a series of inventions and innovations, for example: shoes baby noises while driving; shines shoes while walking child; periodic appearance of a light on a part of the shoe. All these innovations help parents and others to observe the child for the presence of an emergency. At the same time they create a happy baby move.

3. Safe operating expressing capacity the product to be used without affecting the health of the consumer. Currently being discussed more and more about environmental trends on the development of clean technologies and products replace human impact on eco products. This prohibits the marketing of textiles and leather that contain over a certain heavy materials, dyes, adhesives are toxic, however generating carcinogenic diseases. An analysis that identifies sources of pollution are toxic compounds may enter text by: dyes, and technological processes for textile or leather by using auxiliary chemicals by impurities in raw materials, water and fibers used. Using quality products and aimed at improving environmental and maintaining the child's life in a healthy and ecologically pure. To reduce levels of harmful agents is recommended confection following systems: footwear with injected, flexible footwear, footwear returned, shoes with soles stitched to the frame, shoes with soles stitched through insole.

Function features that provide comfort thermo

4. Thermal insulation represented thermal resistance. Thermal protection properties plays an important role, because that leg temperature is maintained within normal limits. As a result of exchange of substances in human body forms a significant amount of energy that cells do not use it fully. Additional energy is converted into heat, which must be eliminated from the body, otherwise its temperature would increase greatly. Since walking out different leg movements (bending, lifting, rubbing) is reached at different temperatures on its surface: dorsal surface temperature is 2-3 °C higher than the planting area and calf temperature by about 3-4°C higher than the dorsal surface. Under normal conditions, the leg area temperature must be kept within 20-30 °C. Foot surface temperature rise above 33 °C lead to overheating and his sweat significant growth and reduce the temperature to 18 °C and even below, causes the sensation of cold, both create uncomfortable situations. Foot descent below -9 °C temperature can cause frostbite [3; 4]. Human body temperature is generally higher than ambient temperature, so heat transfer is allowed from the foot to the shoe environment. Heat transfer in case of natural leather, leather substitutes and other materials used in footwear mainly depends on the degree of porosity. Materials with low toughness, with a structure that blueberries, with a large pore volume, provides a lower heat transfer materials than compact structure and small pore volume. Thermal protective properties of footwear confection depend on the system. Thus, the sole method of fixation affects the thickness and structure of all lower layers of air the size of parts joined. Systems in which the sole is attached to provide better thermal protection than systems that soles foot is stuck, provided the thread to adhere perfectly to the hole and groove seam placement to be closed perfectly. Summer footwear thermal properties depend to a great extent colored material sides. At ambient air temperatures of 16°C, temperature faces beige leather footwear is 39 °C and the black of 47 °C. Therefore, depending on the type and purpose footwear through appropriate choice of materials and thickness of their nature, how to structure and assembly technology, can influence the thermal protective properties of footwear in the phase of creation projectors [3;4] .

5. Absorption of moisture represented hygroscopicity. Normally the welfare of the leg and whole body is characterized by the following indicators: air temperature 21-33 °C, relative humidity

60-73%, CO₂-0,8% content. Removing moisture from inside the footwear is made by: evacuation of a quantity by mechanical vapor with air sweating by the action of "piston" of the foot during walking or even when stationary, when, by involuntary movements, changing support from one leg to another; transfer to the outer vapor diffusion through internal and external phenomena; absorption of moisture in liquid, its accumulation in the inner layers of footwear and wearing disposal outside discontinuing the product. On the exchange of moisture in footwear influence of complex factors which are basic: the openness of footwear, construction features, properties of materials used in the product structure.

Removing moisture inside the shoe is done mechanically at a rate of 40% of them. This dynamic effect occurs mainly while walking and directly depends on the openness of the shoe. In open shoes (eg sandals, shoes, cut the tip and the heel, sides with perforations directly outdoors in an even higher proportion than 40%). The shoes shoes type with a large opening at the top, higher air temperature inside the shoe, compared to the ambient effect of bending piston movement of the foot during walking and / or running and air circulation around the shoe favors the mechanically removing moisture. Moisture transfer by diffusion phenomenon is influenced by: footwear design, thickness of material systems that form the two assemblies, character combining layers in the system, the presence or absence of insulating layers, hydrophilic character of the material, the vapor layer permeability external gradient temperature and humidity gradient. At the beginning of moisture is absorbed unevenly worn shoes of all parts of upper and lower. Time to reach equilibrium moisture of different materials depending on the nature and intensity of sweat released. Moisture absorption intensity of the whole upper parts is always greater than the whole lower parts. Moisture vapor start running outdoors by side in a time when the whole bottom is not yet saturated with moisture. Absorption of water vapor molecules begins with superficial absorption depends on surface characteristics, its electrostatic charge, in particular finishing materials for external cladding. Water absorption is greater on surfaces with-OH groups. Porous structure of the skin, temperature and humidity affect how the absorption of water molecules. Micro capillary diameter less than 10-6 cm are filled by absorbing water vapor and micro pores 10-3 -10-5 cm diameter only by direct contact with liquid water [3-4]. Therefore, parts of mineral leather absorbs moisture more easily than those of vegetable tanned leather, vegetable tannins decrease since particles diameter pores. Tanned, but unfinished, has a very high vapor permeability. These properties often are reduced by applying the coating film finish.

6. Transfer moisture represented vapor by permeability transition. Amount of moisture absorbed by the shoe is highest in the first hour of use, then decreases due to external diffusion process (evaporation through the outer side). Moisture absorbed in the layer of lining material will diffuse through the action of temperature gradient, pressure and the humidity. The amount of removed water vapor diffusion in the environment and surface properties of the material. Temperature during wear shoes reach 32 °C, while the outside temperature may vary within limits -30°C+30°C [4]. Temperature difference between surface material system increases the speed of diffusion of the heated surface to the cold, so the shoes outside diffusion increases with decreasing partial pressure of vapor in outdoors and vice versa. Thus, during operation footwear sweat secreted by the foot is removed out through a complex process which involves diffusion [4]: absorption, passage and water vapors in the space between the sock and the sock lining; absorption, and elimination of moisture passing through the space between the lining and trim sides; absorption, transfer and evaporation of water vapor in the atmosphere by surface uppers. The system as material thickness is greater (in the absence of insulating layers, adhesive films with continuous structure), the more moisture exchange is made on terms more favorable. Ability to transfer moisture from the inside of the shoe assembly is done primarily through education, which generally has a smaller number of layers to the lower assembly and insulating adhesive layers are missing. The peak area and the heel, where bombs are placed and counter generally not moisture is transferred. This diffusion process is appreciate that from the inside of the shoe is removed 10-15% of the amount of sweat secreted by the foot. This process occurs while the component parts of footwear has a good absorption capacity and water vapor permeability. Materials are considered appropriate for girls permeability water vapor within 10-20 mg/cm².8h and 40 mg/cm².8h absorption capacity. All the materials with lower vapor permeability of 10 mg/cm².8h not provide comfortably worn shoes [3-4].

7. Ventilation capacity represented by air permeability. At the surface of the foot is removed carbon dioxide to be removed from the interior of footwear and bring fresh air from outside. Breathing skin pores that oxygen supply and thus the blood is responsible for the overall health of the body. If

starting with the tip foot, heel, ankle and lower leg are insufficiently irrigated with oxygenated blood, can occur while weakening muscle tone and joints. Therefore, for shoes for children are recommended assortment of leather, which by itself capillary-porous structure, providing currency air in both directions [3-4].

8. Minimum effort for behavior that expresses the product's ability to require a minimum mechanical work, body wear process. In these systems users anatomy of the foot did not reach full capacity, they are in the process of evolution, and a shoe with too much mass that constitutes a heavy load can cause abnormalities of the foot. A real opportunity to reduce weight shoe is the use of new porous materials with low densities, to obtain insole and insole roof and use toe counter and nonwovens impregnated or coated with thermoplastic polymers. Children's footwear must be, if possible, not easy to increase the amount of energy consumed by the leg muscles when walking bare foot walking shoes to [4]. Effort will ensure minimum wear and footwear products achieve the minimum bending stiffness, and flexibility feature called shoe. This is regulated standards by type and destination of products from shoes (age and sex of the wearer), the materials and overall lower system confection.

Function to ensure comfort psycho

9. Psycho comfort is expressed sensations generated by the product-body mechanical contact by pleasant sensations or unpleasant sensations. This raises a number of specific issues related to children's interaction with the leg materials, the mechanical properties and surface characteristics of the material are of special importance. A well designed footwear will create the sensation as "pleasant". While a shoe not complied with this group of carriers will create discomfort, eg biting skin allergies, too narrow or wide, will appear static load effects, itching, stinging, "sticky humidity". The comfort and psychologically means the wearer is shoes and dressed in a certain manner, style, conformation and destination that fits, is consistent with the view of the wearer through the prism of its social and economic status [3-4].

Function the ergonomics

10. Correspondence dimensional expressing anthropometric body-mail product. For correspondence dimensional great importance is to determine the main dimensions lasts for serial manufacture of footwear. When switching from the series lasts individual block is necessary to know that change sizes with the basic dimensions of lasts the number of sizes and widths. It is recommended that the top shoe to be slightly high for ease of movement of children. An important factor in choosing shoes at the foot area to prevent slip ping on top shoe foot. This is achieved with the correct choice of footwear width. Children's footwear must be provided on the top with the addition of 10 mm, containing necessary both for increasing leg, while walking as well as elongation of the fingers [4]. Lack of addition that also leads to abnormalities fingers curved, carved foot. Shoes in top shape to meet children's foot, characterized by the right thumb.

11. Easy to shoe-to take off one's shoes, expressing the shoe-to take off one's shoes convenience with minimal effort. Children's footwear should allow easy foot entry within it the shoe and therefore the footwear for adults, vamp should be as short as possible, there by ensuring a wide open quarters. This requirement is justified by the need to avoid excessive demands of the area when placing your fingers in a shoe foot opening rather small, since the muscles provide flexion-extension movement of the fingers and associated ligaments are not fully formed to meet their activities, systems are evolving anatomical foot and fingers are slightly bent position. Effort to reduce children to take off one's shoes shoe and footwear are recommended fixing systems zipper, strap tape "velcro", button closure and buckle, elastic, combinations.

12. Ease of use product features (pockets, belts, straps), that allows use of pockets, straps, boules.

Function to prevent incorrect development of the foot

13. Ensure the proper development of the foot in correct footwear construction, which necessarily must have counter, insole, shank, toe. Presence counter avoid rigid heel joint movement and the emergence of abnormalities of the foot; shank inside the shoe serves to support the longitudinal arch of the foot, sock elastic-plastic properties, spatial format, allows increasing the contact surface of the foot and support plan, that a distribution efforts on a surface as possible, thus

reducing high local pressures. Heel height of 10-15 mm. provides the relative position of foot bones in relation to leg bones requiring minimum system and reduce muscle discomfort [4].

Aesthetic functions

14. The novelty of the model, which expresses the degree of alignment with the latest trends in fashion and design originality. Fashion involves, essentially, change, innovation, originality, creativity and is defined as a sequence of trend or fad, the short term. This in itself is an ephemeral event, a current generated by a complete data base of social, political, economic, cultural-specific period, current is supported by an elite and the imitated and assimilated gradually the other groups who want to integrate the new life style. Continuous on fashion implies exercise requires creative design skills leading to a wide range of products whose range extends from the base to there are and developed. Children's footwear should not blindly follow fashion trends. Factors such as tip shape, form and thickness of the sole, heel height form and must meet certain requirements for building natural anatomical morphology of the foot. The shoes for children regardless of fashion trends is not recommended too sharp-tip shoes and high heels. To ensure the aesthetic function of footwear designers to develop collections of models can be successfully applied techniques such as point or spot, line, color, decorative elements, materials texture, repetition, parallelism, rhythm, contrast, symmetry and asymmetry, etc.[5].

15. Concordance model with life style and clothing of the wearer, that the degree of integration of product and fashion lifestyle of the user.

16. Product appearance, expressing how to harmonize aesthetic system produced in the body-worn and whether the product determines the act of purchasing. Product designer task is to use the correct materials, shapes and colors so that the new product to meet specific requirements for accurate compositional style and originality, plus items such as quality of design and execution. Shapes and lines proposed, all the ornaments and color palette can be used in evidence at face value only through aesthetic work man ship, allowing recruitment of the required product to the consumer parameters.

17. Aesthetics processing technologies, this function is perceived and evaluated subjectively by the user informed, who can give him a certain importance. For realization of this function at the appropriate level, the manufacturer has the technical means to achieve specific objectives of this function.

Functions gnoseologic

18. Function of advertising, which is known, for example, logos. Logos provides information about the product but, more importantly, they help to establish or clear outline of company image. An image is a general impression about a company, maintained or retained by the consumer to think of a product in a certain way. Leads to a logo to grant a certain product credibility in the message you send it. If parents are children's shoes who procure product, and therefore they have certain demands or expectations in terms of quality footwear. When an image is well established, dedicated, consumer feels that in some way identifies with that image is.

19. Carrier of information: the presence of explanatory labels. Mark the labels in a visible place on fabric, sintetic, paper, or woven tapes, attached by stitching or gluing. Some manufacturing companies made direct marking on the lining inside the product by mechanical stamping. The presence of labels is mandatory, as they inform the buyer about the number of size and width footwear, manufacturing footwear brand, article, sign technical quality control body etc. Besides the product label must contain instructions for maintenance.

Function of mounting the product on body

20. Fixing the product on the body that expresses the product can support the body. Construction of footwear for children shall provide for maintaining stable footing, recommended various fastening systems (eg, braid, strap ribbon "velkro" close button or buckle, zippers, elastic, combinations), using counter and collar in the back of the shoe. All these are necessary for proper fit in the shoe and foot to avoid while wearing the deformations and anomalies (eg foot valgoid or varus).

Reliability functions

21. Resistance to mechanical product while expressing resistance to extreme mechanical stress

and the cycle repeated requests mild. One of the basic conditions required materials is to provide sufficient strength to provide safe operating footwear products. While wearing footwear parts are subjected to mechanical components which can not be avoided. An important feature is the elasticity of their materials to ensure product appearance and wearing comfort by molding the foot, and flexibility when worn. Each type of material is characterized by a kind of tensile behavior and other applications, so knowledge of physical and mechanical characteristics of materials for foot wear and their correlation package allows optimal choice of materials [3-4].

22. Resistance to surface wear behavior expressing surface friction materials in the wear and maintenance. In the operation of footwear, outdoor wear marks lining friction especially in the heel region and little finger. Abrasion, slightly lower intensity, is subject to the top of the shoe opening, total edge joining foot, and sometimes pressing its soft tissue. For this reason, the upper outer lining of the surface is recommended to complete the leather lining, this representing a superior abrasion resistance compared to other cladding materials. Counter, by position, is a landmark whose damage is unusable shoes. As a result, he has made of a material to keep the form used throughout the shoe. On top counter must have less rigidity to not cause erosion of the foot, but also to establish good foot. The children's shoes is a landmark called collar, the role of protecting the heel region. Bombs prevent wear on the tip faces, wear can occur due to thumb pressure on the inner surface faces the bending shoe. Pressure has different values, for example 4-7 daN/cm² in front foot and foot area around 2daN/cm² below previous tarsus as pressure is higher, the more galling is more intense [4]. Due to high local pressure, occurs below the surface of the foot while walking a rise in temperature from 80-100°C, which leads to intense wear pad due to its friction on the bearing surface [4]. To slow the wear pad is best to choose the correct nature of the damping material and capacity to take into account climatic conditions and the particular driving carriers.

23. Stability forms and dimensions that expresses stability product forms and dimensions, obtained by design and manufacturing, while wearing and maintenance. Maintaining children's shoe shape can be solved by using counter, bombs, heel and shank in product design and by using suitable plastic material with elastic properties. Last but not least it depends on the parametric technology to manufacture the product.

24. Resistance to biological factors that express the product's ability to resist the action of degradation caused by biological factors. People living near green plants encompass a world invisible to the naked eye but visible under a microscope. Microorganisms live every where, in soil, air, food, the body of plants, animals and man. Children are a category of consumers who want to know every thing, are curious, interested in things around them. For this reason, shoes are always in contact with all kinds of microorganisms, some of them can harm children when they are creating beneficial conditions for development. Beneficial microorganisms grow very fast and natural materials, but also the synthetic, which is a poorer food source, but due to the great powers of adaptation of microorganisms after a while, they become susceptible to attack microorganisms. This causes the value dimimarea shoes, even if the attack does not cause changes in the micro chemical materials. There are changes unsightly such as patches, migration color, cracks, unpleasant odor. Some of these microorganisms exert a negative influence on the human body and shoes that can be a source of infection that lead to various diseases of the feet, especially mycosis type. Dermato mycoses feet, whose occurrence is common epidemiological particularly common use of skin surface conditions it is difficult to cure. Growth of microorganisms in the shoe during wear depends on the microclimate that is created within it, which in turn is conditioned by the materials used to manufacture them. From these considerations must be carefully chosen materials. It requires that shoes be resistant to biological factors in a case or source of food necessary for their development.

Maintainability features

25. Low maintenance product that expresses the ability to be maintained with minimal costs. A number of constituents of sweat accumulate while in parts of footwear; gradually clog the capillary spaces formed between the structural dimensions. Along with this influence of dust, microorganisms that have favorable conditions for development within the shoe and also multiple deformations and surface friction foot interior parts lead to significant descent of resistance, the fragility of the structure and cracks, leading to reduction in both footwear sustainability process and in the use of storage in adverse conditions. An important role in combating these deficiencies is required: treatment to protect against soiling and staining; antibacterial and antimycotic treatment based on combinations so no



surface activity, as well as combinations based on the work surface. These treatments eliminate the unpleasant odor of sweat, dirt and microorganisms accumulated during wear.

26. Ability to recondition expressing renovation and repair capacity of the product.

3. CONCLUSIONS

Getting the functions for various types of shoes and giving due importance to their producers can bring the following benefits: reductions in production costs (not including unnecessary functions), simplifying manufacturing processes, product quality, healthy children, reducing manufacturing cycle time, satisfying the growing extent of user requirements.

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