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DEVELOPMENT OF RECOMMENDATIONS FOR QUALITY ASSURANCE AND CERTIFICATION OF FOOTWEAR FOR A NEWLY DEVELOPED PRODUCT RANGE

Abstract*: in the article, the authors investigated the need to improve the quality management system at light industry enterprises is due to the following important reasons. Firstly, it is an increase in the confidence of potential consumers in the products manufactured by this enterprise. Secondly, this is an opportunity to significantly strengthen its position in existing markets, as well as significantly expand the spheres of influence by entering new domestic and foreign markets. And thirdly, this is a significant increase in labor productivity of any industrial enterprise, which is supposed to introduce QMS with the use of effective management. In the article, the authors analyze the possibilities of the policy and the goals of the enterprise in the field of quality within the framework of the quality management system (QMS).*

Key words*: quality, import substitution, demand, competitiveness, market, profit, demand, buyer, manufacturer, financial stability, sustainable TPP, attractiveness, assortment, assortment policy, demand, implementation paradigm, economic policy, economic analysis, team, success.*

Language*: English*

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Introduction

As noted earlier, TOP is able to survive due to the fact that it will focus on its consumer, trying to please his requirements, i.e., increasing the range of footwear produced, the variety of materials used, colors, the use of new technologies in production, using domestic raw materials , thereby reducing the selling price, but first of all, the buyer is worried about the quality of the purchased product, no one wants to purchase a product that after a short amount of time cannot be used for its intended purpose. In a saturated market and prevailing non-price competition, it is the high quality of products that is the main factor of success.

The quality of manufactured goods is the most important criterion for the activities of any enterprise. Moreover, this product is footwear that must meet the requirements of technical regulations, i.e. must be safe, hygienic, ensure the normal functioning of the foot in terms of sweating of the foot, and the appropriate weight, which does not require unnecessary expenditure of energy when moving. So, shoes are designed to protect the legs, and, consequently, the entire human body from harmful external influences. Quality improvement determines the degree of the firm's survival in market conditions, the rate of scientific and technological progress, the economy of all types of resources used in the enterprise, and the overall increase in production efficiency.

Enterprises that have made significant progress in improving the quality of their products have a real opportunity to:

- to increase the share of the occupied sales market;
- to increase the selling price for products and, accordingly, the profit of the enterprise;
- conduct a more effective advertising campaign for products and the enterprise as a whole;
- to strengthen the confidence of business partners in the implementation of mutual supplies;
- increase the level of competitiveness of products and strengthen the business image of the enterprise.

- Enterprises that are going to unite in a shoe cluster should seriously approach the issue of quality management of their products and the management mechanism.
- Footwear quality management refers to the actions taken during its creation, use or consumption in order to establish, ensure and maintain the required level of its quality.
- The main functions of managing the quality of shoes in a cluster should include, first of all, such functions as:

- forecasting market needs, technical level and quality of footwear;
- planning to improve the quality of footwear;
- rationing of requirements for the quality of footwear and standardization;
- development and production of footwear;
- technological preparation of production;
- organization of relations in terms of product quality between suppliers of raw materials, materials, semi-finished products and components, manufacturers and consumers of footwear;
- ensuring stability and the planned level of quality of footwear at all stages of its life cycle;
- quality control and testing of footwear;
- prevention of defects in production;
- in-house certification of products, technological processes, workplaces, performers, etc.;
- certification of products, works, services, quality systems and production;
- stimulation and responsibility for the achieved level of quality;
- in-house accounting and reporting on the quality of footwear;
- technical and economic analysis of changes in the quality of footwear;
- provision of footwear quality management (legal, informational, material, material and technical, metrological, organizational, technological, financial);
- special training and professional development of personnel.

- The direct objects of management in the shoe cluster will be indicators and characteristics of the quality of shoes, factors and conditions affecting its level, as well as the processes of forming the quality of shoes at different stages of its life cycle.
- The subjects of management will be various management bodies and individuals operating at various hierarchical levels and implementing quality management functions in accordance with generally accepted principles and methods of management.

- It should be noted that the mechanism for managing the quality of footwear is a set of interrelated objects and subjects of management, the principles, methods and functions of management used at various stages of its life cycle and levels of quality management.

- The mechanism for managing the quality of shoes in a cluster should include the following subsystems:

- forecasting and planning the technical level and quality of footwear;
- regulating the quality of footwear directly in production;
- quality control of footwear;
- accounting and analysis of changes in the quality level;
- incentives and responsibility for quality.

- The structure of special subsystems of the mechanism for managing the quality of footwear in a cluster should also include the following subsystems:

- standardization;
- shoe tests;
- prevention of defects in production;
- certification;
- certification.

- And the last subsystem of the mechanism for managing the quality of footwear in the cluster should be providing, which would include the following subsystems:

- legal support;

- information support;
- material and technical support;
- metrological support;
- staffing;
- organizational support;
- technological support;
- financial security.

• Therefore, it is necessary to create a center in the shoe cluster, which would include all these subsystems, and assume the responsibility of performing the above functions. Namely, it is necessary that the center must have a standardization and certification department. The need to create such a center is also due to the fact that only mandatory certification applies to footwear.

• It would be rational to create such a center, which could apply for services not only to enterprises belonging to the shoe cluster, but also to other organizations, whether or not related to the production of footwear. On the example of creating a cluster, taking into account the situations that have developed at shoe enterprises, it is recommended to include a quality management department in this center. Who would coordinate all the actions of the technical control departments at enterprises, collect information about the activities carried out, analyze and propose quality improvement tactics specifically for each enterprise.

• This means that the following departments should operate in the center: the department of standardization, certification and quality management.

• The department for standardization and certification will have to assume such responsibilities as:

- introduction (storage and updating) of the stock of normative and technical documentation of the shoe cluster;
- development of standards of organizations for manufactured footwear;
- examination and approval of draft regulatory and technical documents received by the enterprise from outside;
- issuance of certificates;
- registration of declarations of conformity of manufactured shoes.

• In general, the activities of the center should be aimed at confirming compliance with the requirements of technical regulations and national standards and the provision of services such as the preparation of the following documents:

- certificate of conformity GOST R;
- registration of the declaration of conformity;
- exemption letters for customs or for sale;
- development, approval and registration of standards of organizations.

• Consequently, the inclusion of this center consists in maintaining shoe production at the highest level, managing the quality of products of enterprises in the shoe cluster, promoting the creation, implementation and certification of a quality management system and production for compliance with the requirements of ISO 9001: 2015.Confirmation of conformity is a procedure that results in is documentary evidence that the product meets the established standards.

It can be mandatory or voluntary. Mandatory confirmation of conformity is carried out in two forms: acceptance of a declaration of conformity and mandatory certification.

Mandatory certificationapplies to products and services related to ensuring the safety of the environment, life, health and safety of people's property, i.e., potentially dangerous products and services.

Requirements for products (goods, services, processes) are contained in technical regulations and must be met by all manufacturers in the domestic market and importers when imported into Russia.

Footwear is subject to mandatory confirmation of conformity in the form of mandatory certification and declaration of conformity. Forms of conformity confirmation are shown in Table 1.

Table 1. Forms of confirmation of conformity of shoes

Declaration of conformity of shoes	Shoe certification
Carried out by the manufacturer (supplier, executor)	Conducted by a certification body for products (services)
Conformity document - declaration of conformity	Document certifying conformity - certificate of conformity
Consumer information: - information about the registered declaration for shoes or in the accompanying documentation; - marking with a conformity mark	Consumer information: - a copy of the certificate of conformity; - information about the certificate of conformity in the accompanying documentation; - marking with the conformity mark with the code of the certification body

Declaration of Conformity is a procedure by which the supplier (first party) documents that the product complies with the specified requirements. At the same time, the supplier certifies the quality parameters with a declaration of conformity using the appropriate means of control, product testing with the involvement of a third party.

The declaration of conformity is legally binding along with the certificate of conformity.

The names and designations (codes) of objects subject to mandatory certification are established accordinglymy nomenclatures and lists.

So, in accordance with the order of the Federal Agency for Technical Regulation and Metrology of 18.12.2007, No. 3589 s 01 january 2008 year**...**the attached amendments were introduced into the "Nomenclature of products for which mandatory certification is provided by the legislative acts of the Russian Federation", and in the "Nomenclature of products subject to declaration of conformity", in accordance with which footwear subject to mandatory certification is given in Table 2, and the declaration of conformity is given in table 3.

Table 2. Shoes subject to mandatory certification

Shoe name	Shoe position code according to OK 005-93 (OKP)	Designation of the normative document	Verifiable Requirements of the Governing Normative Document
1	2	3	4
Children's footwear (except for sports, national, orthopedic)	880,000	GOST 26165-2003	Pp. 3.4, 3.6, 4.3, 4.4.2, 4.5, 4.6, 4.7, 4.8
Home and travel footwear for children	880,000	GOST 1135-2005	Pp. 4.4.3, 4.4.4, 4.4.5, 4.4.6, 4.5.1
Casual shoes made of synthetic and artificial leather (except for army)	880,000	GOST 26166-84	Section 2.10
Casual footwear (made of leather and combined with textile materials)	880,000	GOST 26167-2005	A.2.11
Special leather footwear for protection from general industrial pollution	880,000	GOST R 12.4.187-97	Pp. 4.3.1-4.3.10, 4.4.1, 4.4.2, 4.5.1
Children's shoes from Russian	881000	GOST 5394-89	Pp. 2.2.3, 2.2.4, 2.2.5
Special leather footwear for protection from high temperatures (except for firefighters shoes)	881160 881260	GOST 12.4.032-77	Clauses 2.7, 2.8, 2.10, 2.11, 2.13
Special leather footwear for protection against mechanical stress	884160 884260	GOST 28507-90	Pp. 2.3, 2.7.3-2.7.9
		GOST 12.4.024-76	Pp. 1.3, 1.4.2, 1.6, 1.12-1.14
Special vibration-resistant footwear	884160 884260	GOST 12.4.024-76	Pp. 1.3, 1.4.2, 1.6, 1.12-1.14
Special leather footwear for protection against oil, oil products, acids, alkalis, non-toxic and explosive dust	886260 882260 886160 882160	GOST 12.4.137-84	R. 2.4, 2.14-2.24, 2.26-2.27
Special footwear for protection against slipping on greasy surfaces	882160 886160 882260 886260	GOST 12.4.033-77	Pp. 2.4, 2.5, 2.7, 2.8, 2.10

Table 3. Shoes subject to declaration of conformity

Shoe name	Shoe position code according to OK 005-93 (OKP)	Designation of the normative document	Verifiable Requirements of the Governing Normative Document
1	2	3	4
Model shoes	880020	GOST 19116-2005	P.4.5.3
Casual shoes made of leather, textiles and combined shoes made of leather with textile materials (except for special and children's)	882110 882210 887110 887210 888110 888210	GOST 26167-2005	P.4.5.3
Household and travel footwear (except for children)	880040 882140 882150 882240 882250 883150 883240 883250 885140 885150 885240 885250 888140 888150 888240 888250	GOST 1135-2005	P.4.4.3
Shoes with textile upper with rubber molded tops and soles	259000	GOST 14037-79	Clauses 1.2, 2.6 (regarding the abrasion of rubber soles), 2.8
Sports footwear, rubber and rubber-textile	259600	GOST 9155-88	Subclauses 1.2.3, 1.2.4, 1.3.4 (regarding the abrasion of the rubber of the sole and the strength of the bond between the liner and the textile upper)
Children's shoes felted coarse-woolen	816710	GOST 18724-88	Pp. 1.2.4 (in terms of the mass fraction of free sulfuric acid)
Leather footwear (except for special, children's)	881000 881200	GOST 5394-89	Pp. 2.2.3

The procedures, rules, tests and other activities that can be considered as part of the certification process (activity) itself may vary depending on a number of factors. Among them - legislation concerning standardization, quality and certification itself; features of the certification object, which in turn determines the choice of the test method, etc. In other words, the proof of conformity is carried out according to one or another certification system. According to the ISO / IEC document, it is a system that carries out certification according to its own rules regarding both procedure and management.

Carrying out work on certification of footwear is carried out in accordance with section 4 "Of the Rules for certification of textile and light industry products ", approved by the Resolution of the State Standard of Russia dated February 6, 2001 No. 13, includes the following procedures:

– filing an application for certification;
– consideration and decision-making on the application;

– selection of footwear samples for certification purposes is carried out in accordance with the requirements of GOST 9289-78. "Shoes. Acceptance rules", but not less than 3 pairs from each sex and age group;

– selection, identification of samples (identification of footwear includes characteristics of the product by name, type, gender and age, materials used on the upper and lower parts of shoes, methods of fastening parts, seasonality, including the presence and characteristics of insulating lining, finishing) and their testing;

– production verification (if provided by the certification scheme). Mandatory certification of footwear is carried out according to schemes 1, 1a, 2, 2a, 3, 3a, 4, 4a, 5, 6, 7, 9, 9a, 10, 10a. When certifying footwear for children, it is not recommended to use schemes 9, 9a, 10 and 10a;

– issuance of a certificate of conformity;

– inspection control of certified products in accordance with the certification scheme.

The list of indicators used in the mandatory certification of footwear, regulatory documents establishing indicators and methods of their testing are given in table 4.

Table 4. The list of indicators confirmed during the obligatory certification of footwear

Name of production	OKP code	Characteristics, (indicators) of products, confirmed during certification	Regulations	
			Defining indicators	Establish methods for their determination.
1	2	3	4	5
Children's footwear (except for sports, national and orthopedic)	880,000 881000	Compliance of the materials used and the design features of the footwear with the requirements of the Ministry of Health of Russia	GOST 26165-2003 GOST 1135-2005 GOST 5394-89	SanPiN 2.4.7./1.1.1286-03
		General and permanent deformation of the toe cap and heel of the shoe (not determined for leather footwear)		GOST 9135-73
		Flexibility of the shoe		GOST 9718-88
		Weight of shoes (determined for all age and gender groups except for shoes for schoolchildren, girls and boys)		GOST 28735-2005
		Strength of fastening of parts of the bottom of the shoe		GOST 9134-78 GOST 9292-82
	885140 885150 885250 888140 888150 888240 888250	Flexibility (only for leather shoes)		GOST 9718-88
		Product type; Age and sex affiliation; Materials used on the top and bottom parts		Visually
		Bottom fastening methods; Seasonality, including the presence and characteristics of the insulating lining, finishing		
Shoes with textile upper with rubber molded tops and soles	259000	Shoe thickness; Relative extension;	GOST14037-79	GOST14037-79

		Relative permanent deformation after rupture;		
		Product type; Gender and age The materials used for the details of the bottom and top; Bottom fastening methods; Seasonality, including the presence and characteristics of the insulating lining, finishing		Visually
Sports footwear, rubber and rubber-textile	259600	Shoe thickness; Conditional strength	GOST9155-88	GOST9155-88
		Relative extension; Product type; Gender and age The materials used for the details of the bottom and top; Bottom fastening methods;		
		Seasonality, including the presence and characteristics of the insulating lining, finishing		Visually
Special footwear for protection against mechanical stress	884160 884260 259311 259312	The presence of the necessary protective structural elements	GOST 12.4.072-79 GOST 28507-90	GOST 12.4.072-79 GOST 28507-90
		Linear dimensions	GOST 12.4.072-79 GOST 28507-90	GOST 9133-78 GOST 164-90 GOST 427-75 GOST 7502-89 GOST 11385-89
		Strength of workpieces seams	GOST 12.4.072-79 GOST 28507-90	GOST 9290-76 GOST 9134-78 GOST 9290-76
		Strength of fastening of parts of the bottom	GOST 28507-90	GOST 9134-78 GOST 9292-82
		Strength of fastening of heels	GOST 28507-90	GOST 9136-72
		Impact resistance of shoes with protective toe caps	GOST 12.4.024-76	GOST 12.4.151-85
		General and permanent deformation of the toe and heel	GOST 28507-90	GOST 9135-73
		Decrease in strength indicators from exposure to machine oil	GOST 12.4.024-76	GOST 9.030-74
		Flexibility	GOST 28507-90	GOST 9718-88 GOST 12.4.024-76
		Water resistance	GOST 12.4.024-76	GOST 12.4.072-79
		Water resistance	GOST 12.4.024-76	GOST 26362-84
		Fastening strength of outer protective socks; Conditional strength	GOST 12.4.072-79	GOST 12.4.106-81 GOST 270-75
		Relative extension	GOST 12.4.072-79	GOST 270-75

		Relative permanent deformation after rupture	GOST 12.4.072-79	GOST 270-75
		Internal safety clearance in the forefoot	GOST 12.4.072-79	GOST 12.4.072-79
		Abrasion	GOST 12.4.072-79	GOST 426-77
		Shock-proof toe cap length	GOST 12.4.072-79	GOST 12.4.072-79
		Weight	GOST 12.4.072-79 GOST 28507-90	GOST 23676-79
		Marking	GOST 12.4.072-79 GOST 28507-90	GOST 12.4.103-83
Special footwear for protection against oil, oil products, acids, alkalis, non-toxic and explosive dust	259311 259312 259530 886260 882260	Availability of necessary protective structural elements	GOST 12.4.137-84 GOST 12265-78 GOST 12.4.072-79	GOST 12.4.137-84 GOST 12265-78 GOST 12.4.072-79
		Linear dimensions	GOST 12.4.137-84	
			GOST 12265-78 GOST 12.4.072-79	GOST 9133-78 GOST 164-90 GOST 7502-89 GOST 11358-89 GOST 427-75
		Strength of workpieces seams	GOST 12.4.137-84	GOST 9290-78
		Strength of fastening of parts of the bottom with the top	GOST 12.4.137-84	GOST 9292-82 GOST 9134-78
		Strength of fastening of heels	GOST 12.4.137-84	GOST 9136-72
		General and permanent deformation of the toe and heel	GOST 12.4.137-84	GOST 9135-73
		Factor of reduction of fastening strength from exposure to aggressive media	GOST 12.4.137-84	GOST 12.4.165-85
		Flexibility	GOST 12.4.137-84	GOST 9718-88
		Conditional strength	GOST 12.4.137-84	GOST 270-75
		Relative extension	GOST 12265-78	GOST 269-66 GOST 270-75
			GOST12.4.072-79	
		Permanent deformation after the break	GOST 12265-78 GOST12.4.072-79	GOST 269-66 GOST 270-75
		Abrasion	GOST 12265-78 GOST12.4.072-79	GOST 426-77
		Waterproofness	GOST 12265-78	GOST 12265-78
		Change in sample volume after exposure to a mixture of	GOST 12265-78 GOST 12.4.072-79	GOST 9.030-74

		reference isooctane and toluene		
		The size of the internal safety gap in the toe of the boots with shockproof toecaps;	GOST 12.4.072-79	GOST 12.4.072-79
		Weight	GOST 12265-78 GOST 12.4.072-79 GOST 12.4.137-84	GOST 24104-80 GOST 23676-79 GOST 16993-71
		Marking	GOST 12265-78 GOST 12.4.072-79 GOST 12.4.137-84	GOST 12.4.103.-83
Special footwear for protection from high temperatures	881160 881260	Availability of necessary protective structural elements	GOST 12.4.032-77	GOST 12.4.032-77
		Linear dimensions		GOST 9133-78
		Determination of the strength of the seams of workpieces		GOST 9290-76
		Determination of the fastening strength of the bottom parts;		GOST 9134-78 GOST 9292-82
		Determination of the deformation of the toe and heel		GOST 9135-73
		Coefficient of reduction of strength of fastening of parts of the bottom from high temperatures		GOST 12.4.138-84
		Flexibility		GOST 9718-67
		Impact resistance of protective socks		GOST 12.4.151-85
		Weight		GOST 24104-80
		Marking		GOST 12.4.103-83
Special footwear for vibration protection	884160	Availability of necessary protective structural elements	GOST 12.4.024-76	GOST 12.4.024-76
		Linear dimensions		RD 17-06-036-90
		Bottom attachment strength		GOST 9134-78 GOST 9292-82
		Strength of fastening of heels		GOST 9136-72
		Transmission ratio		GOST 12.4.024-76
		Flexibility		GOST 422-75
		Weight		GOST 12.4.024-76
		Marking		GOST 12.4.024-76
Special footwear for protection against slipping on greasy surfaces	882160 886160	Strength of workpieces seams	GOST 12.4.033-77	GOST 9290-76
		The strength of the fastening of the bottom parts;		GOST 9134-78 GOST 9292-82
		Strength of fastening of heels;		GOST 9136-72
		Deformation of the toe and heel;		GOST 9135-73

		Flexibility;		GOST 9718-88
		Linear dimensions and weight;		RD 17-06-036-90
		Marking		GOST 12.4.103-83

The numerical values of quality indicators obtained as a result of shoe tests should not go beyond the standard values specified in GOST 21463-87 "Shoes. Strength standards ". The strength of the thread fasteners of the parts of the shoe blank must comply with the standards specified in table 5.

Table 5. Strength standards of thread fastenings for parts of the blank of footwear

The name of the fastened materials of the outer parts of the upper of the shoe	Breaking load for each sample, N / cm, not less			Test Method
	With one line	With two lines	For lines more than two	
1	2	3	4	5
1. calves, outgrowth, half-cutter, goby, cowhide, bovine, pigskin, bull, horse front, textiles in combination with leather, textiles	90	115	145	According to GOST 9290-76
2.chevro, chevret, velor, suede, split leather, goat leather	75	85	95	According to GOST 9290-76
3. artificial, synthetic leather; artificial, synthetic leather in combination with leather	80	90	100	According to GOST 9290-76
4. leather: Shaft with front Outside rear strap, seam with bootleg; Back outer strap with upper Vamp with ankle	- - -	165 135 175	175 - 175	According to GOST 9290-76

The strength of the attachment of the sole with the blank of the upper in the shoe with chemical methods of attachment must comply with the standards specified in table 6.

Table 6. Standards for the strength of fastening the sole with the preparation of the upper in the shoe of chemical fastening methods

Outsole material	Tol-the thickness of the sole you are minimal, mm	The strength of the sole on 1 cmthe width of the tightening edge; N / cm, not less, for the original size of a half pair of shoes								Me-tod use-py-tany
		husband	wives	Boy-chico-waya	De-vi-whose	School for boys and girls	Preschool		Gu-sa-ri-ko-waya	
							2 sub-group	1 sub-group		
1	2	3	4	5	6	7	8	9	10	11
1.leather for the bottom of the shoe	2.0-2.5 3.0 3.5 4.1	36 37 39 42	34 35 37 39	34 35 37 39	28 29 30 32	26 27 29 31	25 26 28 30	24 25 27 29	23 24 25 27	GOST 9292-82
2.skin fiber	2.0-2.5 3.0 3.6 4.2	47 48 49 53	45 46 47 51	45 46 47 51	31 32 34 36	30 31 32 34	- - - -	- - - -	- - - -	GOST 9292-82

3. rubber non-porous, rubber "styronil" and "transporter"	2.0-2.5 3.0 4.0 5.0	45 46 48 53	42 43 45 50	42 43 45 50	28 30 33 38	27 28 30 35	26 27 29 34	25 26 28 32	- - - -	GOST 9292-82
4.porous rubber, polyvinylchloride Porous rubber, polyvinyl chloride	4.0-4.5 5.0 5.5 6.0 8.0 10.0 12.0 14.0 15.0	44 45 47 48 58 68 86 94 109	42 43 44 46 53 63 76 91 108	42 43 44 46 53 63 76 91 108	31 32 34 36 39 50 61 71 82	30 31 32 34 38 47 56 67 75	28 29 30 32 37 45 55 61 74	27 28 29 31 36 42 52 62 71	26 27 28 - - - - - -	GOST 9292-82
5.polyurethane, thermoplastic elastomer	5.0 6.0 8.0 10.0 12.0 15.0	44 47 58 69 84 109	43 46 53 63 75 108	43 46 53 63 75 108	33 38 43 53 60 83	32 36 42 51 59 79	28 32 37 43 53 75	27 31 35 41 51 74	- - - - - -	GOST 9292-82

The strength of fastening parts of the bottom in shoes of thread and combined fastening methods must comply with the standards specified in table 7.

Table 7. Strength standards for fastening bottom parts in shoes with thread and combined fastening methods

Name of the fastened parts	The name of the bonded materials	Fastening method	Seam fastening strength per 1 cm of each sample N, not less	Test Method
1	2	3	4	5
1.soles with shoe uppers	Leather; leather, textiles, artificial and synthetic leather Non-porous rubber, leather; leather Non-porous rubber, polyurethane; leather	Doppelny, stitched, sandal, "Parko" Glue-stitching, stitching-glue-stitching Onboard	140 110 120	According to GOST 9134-78 According to GOST 9134-78 According to GOST 9134-78
2.soles with padding	Porous rubber; leather	Rant-glue, dopple-glue, sandal-glue, stitch-sandal-glue, nail-glue	thirty	GOST 9292-82
3.soles with welts	Leather; leather for welts	Rantovy, "Parko"	130 110	GOST 9134-78 GOST 9134-78
4.soles (with undercut) with welt	Porous rubber; leather for welts	Rant	140	GOST 9134-78
5.Plate with shoe upper blank	Leather; leather	Sandal-glue, dopple-glue, stitching-sandal-glue	120	GOST 9134-78

6.wrap-around backing	Leather; leather for welts	Rant-glue	120	GOST 9134-78
7. welt with shoe upper preparation	Leather for welts; textile	"Parko"	80	GOST 9134-78
8.welt with natural lip insole with artificial lip	Leather for welts; leather	Rantovy, welt-glue	120 160	GOST 9134-78 GOST 9134-78

The strength of fastening parts of the bottom with the blank of the upper of the shoe, studded and combined fastening methods must comply with the standards specified in table 8.

Table 8. Standards for the strength of fastening parts of the bottom with the blank of the upper of the shoe, studded and combined fastening methods

Name of the fastened parts	The name of the bonded materials	Fastening method	Strength of each sample, N / cm, not less	Test Method
Sole with shoe upper blank	Non-porous rubber (with leather backing or trim); yuft	Gvozdevoy	150	GOST 9134-78
	Leather; yuft Porous rubber; leather (in the presence of a leather backing and an intermediate layer of leather fiber or non-porous rubber) Leather; leather Non-porous rubber, leather Non-porous rubber (with leather backing); leather Rigid, semi-rigid polyurethane; leather Polyurethane; leather	Gvozdevoy Nailing the substrate and intermediate layer Bonded midsole and outsole Screw Screw Gvozdevoy Gvozdevoy Nail-side Also	110 250 25 120 90 110 150 170 150	GOST 9134-78 GOST 9134-78 GOST 9292-82 GOST 9292-82 GOST 9134-78 GOST 9134-78

The strength of fastening heels in shoes must comply with the standards specified in table 9.

Table 9. Norms for fixing heels in shoes

Upper workpiece material	Age group	Heel height	Heel material	Heel attachment strength in a half pair of shoes, N, not less	Test method
1.leather, textiles, artificial materials Leather, textiles, artificial materials 2.Uft	Womens Male, female, girlish Male, female, boy, girl, school Preschool Mens All other age and sex groups	Extra high, high Average Short Short short Short	Synthetic, wood Synthetic, rubber Leather, rubber, wood, synthetic Rubber Leather Rubber (molded) Rubber	850 850 800 450 1200 900 700	GOST 9136-72 GOST 9136-72 GOST 9136-72 GOST 9136-72 GOST 9136-72

The deformation of the toe caps must comply with the standards specified in table 10.

Table 10. Toe deformation rates

Workpiece material	Toe material	Toe deformation in shoes, mm, not more		Test Method
		General	residual	
Synthetic and artificial leather, textiles	Elastic materials of the EP-2, ES-2 brands Thermoplastic materials with	- -	1.0 1.0	GOST 9135-2004 GOST 9135-2004
	coating based on transpolyisoprene or polymers Leather for the bottom of shoes, nitro leather-T shoe (for all age and gender groups, except for preschool)	2.5	-	GOST 9135-2004

The deformation of the backdrops must comply with the standards specified in table 11.

Table 11. Deformation rates of backdrops

Shoe Upper Material	Back material	Heel deformation in shoes, mm, no more		Test Method
		General	Residual	
Synthetic and artificial leather, textiles	Cardboard with a high leather fiber content Leatherboard grades 3-1-11	-	1.0	GOST 9135-2004

	Coated thermoplastic materials based on transpolisoprene or polymers	-	1.0	GOST 9135-2004
	Nitroskozha-T shoe, leather for the bottom of shoes,	-	1.0	GOST 9135-2004
	cardboard (for all age and gender groups, except for preschool)	4.0	-	GOST 9135-2004

For shoes with a textile upper with rubber molded liners and soles, the thickness of the outsole rubber with a reef without textiles and internal parts must correspond to the values indicated in Table 12, and in terms of physical and mechanical parameters, the rubber used for the manufacture of shoe soles and liners must comply with the standards, specified in table 13 in accordance with GOST 14037-79 "Shoes with a textile upper with rubber molded liners and soles. Technical conditions ".

Table 12. Guideline values for shoe thicknesses with textile uppers and rubber overmolded liners and soles

Measurement locations	Shoe thickness, mm, not less				
	male	female	School for boys and boys	School for girls and maiden	Children
Outsole	5	4	4	4	4
Sole with heel	9	8	8	8	6

Table 13. Standard values of physical and mechanical indicators of rubber used for the manufacture of shoes with a textile upper and rubber with molded liners and soles

Indicator name	Norm							
	Rubber for obsoyuzok				Sole rubber			
	Category 1		From the state. Quality mark		Category 1		With the State Quality Mark	
	Cher	Colour	Cher	Colour	Cher	Colour	Cher	Colour
Conditional strength, mPa, ($кгс$ / $см^2$), not less	8.0 (80)	8.0 (80)	9.0 (90)	9.0 (90)	8.0 (80)	8.0 (80)	9.0 (90)	9.0 (90)
Elongation,%, not less	300	400	300	400	240	280	300	400
Relative residual deformation after rupture,%, no more	25	40	25	40	25	40	25	40

And the thickness of the sole of rubber-textile shoes (together with a set-in insole, a tight-fitting lattice, if any, and a reef) and the thickness of the sole of swimming shoes with a reef must correspond to those given in Table 14, according to the physical and mechanical parameters of the rubber used for the manufacture of shoes must comply with the standards, given in table 15 in accordance with GOST 9155-88 “Sports footwear, rubber and rubber-textile. Technical conditions ".

Table 14. Guideline values for the thickness of the sole of the rubber-textile footwear of bathing shoes with a reef

Type of footwear	Shoe group	Sole thickness, mm, not less	
		Outsole	Heel
Rubber-textile shoes and boots	Children	4.0	6.0
	School, boy, female, male	5.0	7.0
Rubber bathing shoes	Children, school, boys, women and men	2.0	2.0
Note: – for shoes with spikes, the thickness of the sole without taking into account the height of the spikes must correspond to that given in table 14; – for shoes without elevation in the heel, the thickness of the sole must be at least 4 mm for nursery and 5 mm for school, boys, women and men.			

The certification body keeps records of the certificates and licenses issued by it for the use of the conformity mark in accordance with the rules for storing acts and sends information about them to the Federal Agency for Technical Regulation and Metrology in accordance with the established procedure. Documents and materials used in the certification of TLP products must be stored in the certification body that issued the certificate. The decision on certification is accompanied by the issuance of a certificate of conformity to the applicant or its refusal. With positive results of tests (inspections) provided for by the certification scheme, and examination of the documents submitted, a certificate of conformity is drawn up and registered.

Table 15. Standard values of physical and mechanical indicators of rubber used for the manufacture of shoes

Indicator name	Norm for sports shoes		Norm for bathing shoes	Test methods
	Soles and linings of rubber-textile shoes			
	black	White and colored		
Conditional strength, mPa ($кгс / см^2$), not less	9.0 (90)	12.0 (120)	15.0 (150)	GOST 270-75
Elongation,%, not less	350	500	500	GOST 270-75
Rubber outsole abrasion $м^3/ТДж$ ($см^3/кВт$), no more	200 (720)	205 (740)	-	GOST 426-75
The bond strength of the rubber casing with the textile upper, $Н/м$ ($кгс/см$), not less	1200 (1.2)	1500 (1.5)	-	GOST 6768-75

In case of negative results of certification tests or the applicant's refusal to pay for certification work, an opinion is issued indicating the reasons for the refusal to issue a certificate.

The presence of a certificate of conformity for products subject to mandatory certification is a prerequisite for their implementation and (or) putting into operation.

Inspection control of a certified facility. If this stage is provided by the certification scheme, then it is carried out by the body that issued the certificate during the entire period of validity of the certificate, as a rule, at least once a year in fore intermittent checks, and, if necessary, unscheduled.

Inspections include testing of product samples and tests necessary to confirm that marketed products continue to meet established requirements. requirements confirmed during certification.

Indicators for determining the frequency and volume ofinspection control are:

– the degree of potential hazard of the product;
– production stability;
– volume of issue;
– availability of a quality system;
– the cost of the inspection control.

The scope and procedure for conducting inspection control establish the rules for certification of homogeneous products.

Unscheduled inspections can be carried out in case of claims to the quality of products from consumers, trade organizations and bodies exercising public and state control over the products for which the certificate is issued.

Inspection control includes:

– analysis of incoming information about certifiedproducts;
– creation of a commission to conduct control;
– testing and analysis of their results;
– registration of control results and decision making.

The results of the inspection control are drawn up in an act, in which makes a conclusion on the state of production of certified products and the possibility of maintaining the validity of the issued certificate.

The act is kept by the certification body, and copies of it are sent to the applicant (manufacturer, seller) and to the organizations that took part in the inspection control.

Based on the results of inspection control in case of non-compliance of products with the requirements of regulatory documents controlled during certification, the certification body mo Can suspend or revoke a certificate. This can also happen in the following cases:

– changes in the product regulatory document or test method;
– changes in the design, composition or completeness of ductions;
– changes (non-fulfillment) of technology requirements, method control and testing, quality assurance system, if the listed changes can cause non-conformity of products to the requirements controlled during certification.

The decision to suspend the certificate is made if, by means of corrective measures agreed with the certification body that issued it, the applicant can eliminate the detected causes of non-compliance and confirm, without re-testing in an accredited testing laboratory, the compliance of the product with the requirements of regulatory documents. If this cannot be done, then the validity of the certificate is canceled.

Information on the suspension (or cancellation) of the certificate is brought to the attention of all interested organizations.

Consider the actions of the certification body and the manufacturer when carrying out corrective actions.

Corrective actions are carried out in case of violation of the conformity of products to the established requirements.

When carrying out corrective actions, the certification body performs the following:

– suspends the validity of the certificate and the validity of licenseszii for the use of the mark of conformity;
– informs interested participants of certification about it;
– sets the deadline for the implementation of corrective actions;
– controls the implementation of corrective actions by the manufacturer (seller).

When taking corrective actions, the manufacturer (seller) must:

– determine the scale of the violations identified;
– notify consumers, the public, interested organizations about the dangers of using (operating) products.

Based on the results of the corrective measures taken, the certification body indicates to the manufacturer (seller) the need for a new marking to distinguish the product before and afterafter corrective measures, while in each specific case, the certification body determines the nature and type of marking and informs interested participants in the certification-tifications about it.

If the manufacturer (seller) does not comply with the If measures are taken or their ineffectiveness, the certification body revokes the certificate and revokes the license to use the conformity mark. In accordance with GOST R 51000.5-96 "General requirements for bodies for certification of products and services" (Approved by the Resolution of the State Standard of the Russian Federation (Federal Agency for Technical Regulation and Metrology) dated 02.29.96 N 138) the following requirements are imposed on the certification body:

– the certification body shall perform functions to ensure that the appropriate certification procedures are carried out; to be impartial, independent of the applicant (manufacturer, seller) and consumer (to be a third party), not to have any commercial interests, not to be part of an organization, and not to be connected by administrative, financial, commercial or other ties with an organization with a direct commercial interest in the product or service subject to certification. The certification body and its personnel should not be subject to commercial, financial or other pressures that could influence the results of certification; have the competence to objectively and reliably carry out certification of products or services;

– The structure of the certification body should ensure the impartiality and equal opportunity for all interested parties to participate in the operation of the certification system. For this, representatives of interested organizations participate in the work of the Coordinating Council functioning under the certification body;

– the certification body, as a rule, must have its own testing laboratory, covering all or part of its scope of accreditation (the testing laboratory must be accredited according to the relevant rules);

– the certification body shall have and provide upon request: an organizational chart clearly defining the structure of the certification body. The structure of the certification body must ensure the performance of certification work in the declared scope of accreditation; scheme of interaction with testing laboratories and other participants in the certification system; information about the sources of financing for the activities of the certification body; a documented description of the rules and procedures for certification; documentation defining its legal status;

– the personnel of the certification body must have the necessary competence to carry out their duties;

– specialists of the certification body who assess the conformity of products or services, testing and inspection control must be experts of the certification system in the field corresponding to the scope of accreditation of the certification body;

– If any work is outsourced to another organization, the certification body must be satisfied that the subcontracting personnel of that organization comply with the requirements of this standard. The scope of work performed by another organization or non-staff should be limited;

– the certification body must have a fund of documents necessary for certification, a control system for this documentation and ensure: availability of documents currently in force at the workplace; timely introduction of changes or amendments to documents in accordance with the established rules. This work should ensure their direct and rapid implementation; removal of outdated documentation; advance notification of holders of certificates of conformity and other users about changes and amendments to the documentation by means of communication means or through periodic publications;

– the certification body shall maintain a registration and logging system. Records and records shall show how each certification procedure has been carried out, including test reports and inspection reports for certified products. All protocols and registration records must be securely stored for a specified period, while maintaining confidentiality in relation to the interests of the applicant, if this does not contradict current legislation;

– the certification body must have the necessary tools and documented procedures to allow certification of products in accordance with the requirements for this specific area of production activity;

– if the certification body conducts tests, then the testing laboratory included in it must comply with the established requirements and be accredited in accordance with the relevant rules. If tests (including on behalf of the certification body) are carried out by another testing laboratory, the certification body must be sure that this laboratory meets the established requirements and is accredited in accordance with the relevant rules;

– the inspection control carried out by the certification body must meet the requirements of the relevant certification system and international documentation;

– if the certification body uses the services of another organization, it is necessary to conclude a documented agreement (contract) with it, including the observance of confidentiality;

– the certification body must have a Quality Manual and documented procedures establishing the procedure for confirming the certification body's compliance with the requirements of GOST R 51000.5-96;

– the certification body must ensure the confidentiality of information obtained during the certification process;

– the certification body must have a complete list (register) of certified products or services with an indication of the holders of certificates and (or) permits (licenses) for the use of the conformity mark. This list should be available to interested individuals and organizations;

– the certification body should establish rules for handling complaints during certification;

– the certification body must carry out internal checks to assess its compliance with the requirements of GOST R 51000.5-96. Such inspections should be recorded and their details, as well as the corrective actions taken, should be communicated to personnel. They should also be available to those entitled to this information;

– the certification body is obliged to control the use of the issued certificates of conformity, marks of conformity, permits (licenses) for their use;

– the certification body must have documented procedures for canceling or suspending the validity of certificates of conformity, canceling or suspending the validity of permits (licenses) for the use of conformity marks.

High quality of footwear is achieved due to careful preparation of production, rhythmic work and strict adherence to technological processing regimes when performing individual operations, and control at each stage of production.

Various types of technical control are usually classified as follows:

– by control methods: organoleptic, instrumental, analytical, automatic;

– by the complexity of execution (by qualification): simple, medium, difficult;

– by the completeness of coverage of semi-finished products: solid, selective;

– by location in the technological scheme: continuous, selective;

– by the number of operations covered: general, private;

– in order of execution: preliminary, accompanying, subsequent;

– by the location of the control points: stationary, volatile.

Organoleptic control (visual) - the quality of parts and products is assessed organoleptically.

Instrumental control - determination of the shape and size of the controlled object using simple measuring instruments and devices.

Analytical control is an assessment of the properties of controlled objects by laboratory testing of materials, parts and products for comparison with GOST standards.

Automatic control - automatic registration of phenomena and automatic application of measures to eliminate possible violations of the established parameters of the technological process or the establishment of a work order.

Simple control is carried out at the object of observation and is carried out organoleptically, or using the simplest instruments.

Control of medium complexity - performed at workplaces using analytical control methods.

Complex control is carried out in laboratories by the method of analytical control.

Full control covers all semi-finished or finished products.

Sampling control covers only a certain part of products or semi-finished products processed in operation, while the results of quality control of some of the controlled objects apply to all products. On operations with an unstable technical process, it is recommended to use only a solid one.

Interoperational control is carried out during the transition of a product from one operation to another and covers all products.

Final control is carried out on the release of finished products and aims to establish the appropriate quality of finished products to the requirements of GOST.

General control covers all operations of the production process from start to finish and can be carried out as continuous or selective.

Private control covers part of the leading operations of the production process and can be carried out as a complete or selective.

Preliminary control is carried out as the main type of technical control, carried out before performing operations to determine the quality of materials, chemicals, accessories, equipment and spare parts entering the factory.

Concomitant control is reduced to checking the results of operations in the course of its implementation, as well as to monitoring the progress of the technical process in order to prevent the occurrence of low-quality products and their timely detection during production.

Subsequent control is a check of the results of work at the operation, in the stream, at the site, in the shop, at the enterprise. Subsequent control compared to preliminary and concomitant is the least effective.

Stationary control is carried out at the workplace when a large number of controlled items arrive and when it is advisable to include the control point in the production line.

Flying control is carried out over the course of the technical process, carried out by the foremen of production areas and laboratory technologists.

The use of this or that type of control is determined by the technical possibility of using a certain type of control, the importance of the operation, and the economy. Table 16 lists objects and types of control to which they can be subjected.

The most progressive control method, which enables inspectors to effectively fight for product quality, to signal faults even before the appearance of defective products, is the statistical method.

The meaning of statistical methods of quality control is to significantly reduce the cost of its implementation in comparison with continuous control, on the one hand, and in the exclusion of accidental changes in product quality, on the other.

Table 16. Objects and types of control

Objects of technical control	Types of technical control
Upper materials (chrome leather)	Organoleptic Selective (in stock) Instrumental (periodic) Physicomechanical and chemical (in the laboratory)

Lining (chrome leather)	Organoleptic Selective (in stock) Physicomechanical Analytical (in the laboratory)
Textile	Organoleptic Selective (in stock) Physicomechanical Analytical (in the laboratory) Instrumental
Accessories (blocks, hooks, buttons, buttons, nails, buckles, etc.)	Selective (in the laboratory) Organoleptic Instrumental (periodic)
Auxiliary materials (threads, glue, heels)	Selective (in the laboratory) Organoleptic (for heels) Physical and mechanical (for threads) Chemical (for glue)

There are two areas of application of statistical methods in production (Figure 1):

– when regulating the course of the technological process in order to keep it within the specified limits (left side of the diagram);

– upon acceptance of manufactured products (right side of the diagram).

Areas of application of statistical methods of product quality management

Typically seven are used for data analysis., so-called, statistical methods or quality control tools (simplest methods):

– delamination (stratification) data;
– charts;
– Pareto chart;
– causally-investigation chart (Ishikawa diagram or "fish skeleton");
– checklist and bar chart;
– scatter chart;
– control charts...

1) Delamination (stratification).When dividing data into groups in accordance with their characteristics, the groups are called layers (strata), and the separation process itself - delamination (stratification).

There is always a greater or lesser scatter in the measurement results.... If we stratify by factors, generating this spread, it is easy to identify the main reason for its appearance, reduce it and achieve better product quality...

Delamination can be done like this:

– by performer (by gender, work experience, qualifications and T...d.);

– by machines and equipment (new or old, brand, type, etc....d.);

– by material (at the place of production, party, mind, quality of raw materials, etc....d.);

– by production method (by temperature, technological reception, etc....d.).

The delamination method in its pure form is used when calculating the durability of a product., when it is required to estimate direct and indirect costs separately for products and lots, when assessing the profit from the sale of products separately by customers and by products, etc....d...

2) Graphical presentation of data widely used in industrial practice for clarity and ease of understanding the meaning data... There are the following types of graphs:

a) Grafik, polyline,applied, for example, to express the change of what-or data overflow time...

b) Pie and strip charts are used to express the percentage of the data under consideration.

Figure 1 shows the ratio of sales proceeds for certain types of footwear (A, B, C), a trend is visible: product B is promising, but A and C are not.

c) Z-shaped graph (Figure 1) is used to express the conditions for achieving these values. For example, to assess the general trend when registering actual data by month (sales volume, production volume, etc.)

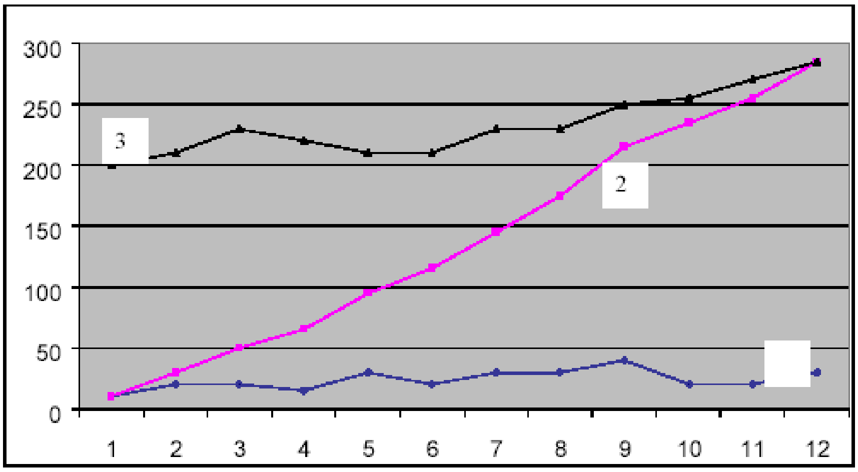


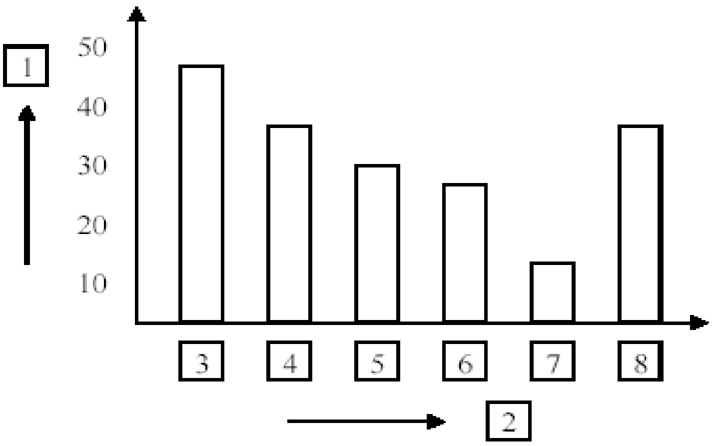
Figure 1. Example of a Z-shaped plot

According to the changing total, it is possible to determine the trend of change over a long period. Instead of a changing total, you can plot the planned values and check the conditions for reaching them.

d) The bar graph (Figure 2) represents a quantitative dependence, expressed by the height of the bar, of factors such as the cost of the product from its type, the amount of losses as a result of rejects from the process, etc.

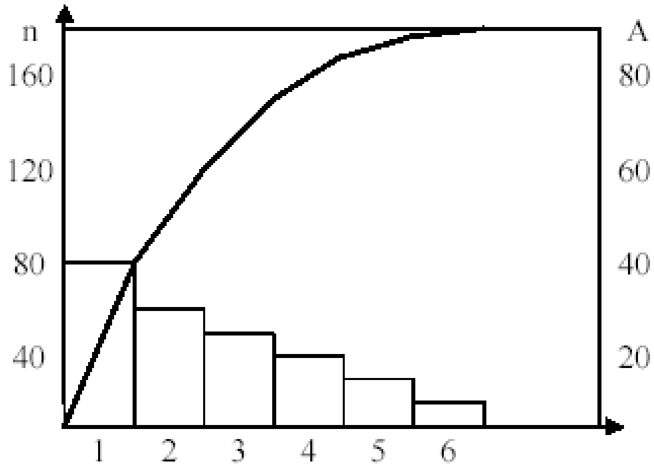
Varieties of a bar graph are a histogram and a Pareto chart.

3) Pareto diagram.Scheme, built on the basis of grouping by discrete features, ranked in descending order (for example, by frequency of occurrence) and showing the cumulative (accumulated) frequency, called a Pareto chart (picture 3).



1 - the number of purchase incentives; 2 - incentives to buy; 3 - quality; 4 - price reduction; 5 - warranty periods; 6 - design; 7 - delivery; 8 - others

Figure 2. An example of a bar graph



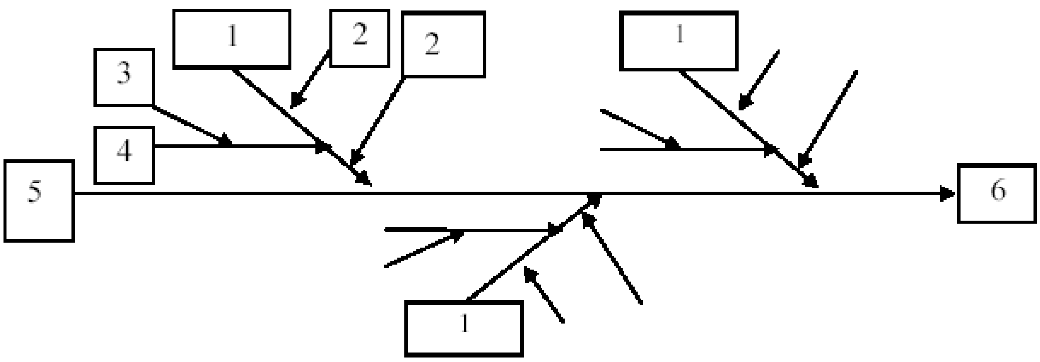
1 -errors during production; 2 -poor quality raw materials; 3 -poor quality tools; 4 -poor quality templates; 5 -poor quality drawings; 6 -other; A - relative cumulative (accumulated) frequency, %; n -number of defective items...
Figure 3. Pareto chart example...

The above diagram is based on the grouping of defective products by type of marriage and their location in descending order of the number of units of defective products of each type.... With its help, you can evaluate the effectiveness of the measures taken to improve product quality., building it before and after making changes...

4) Causal diagram (Figure 4).

Causally-investigative chart used, when it is required to investigate and portray the possible causes of a particular problem... Its application allows you to identify and group conditions and factors, affecting this problem...

5) Checklist(accumulated frequency table) compiled to build histogramsdistribution, includes the following columns: (table 17).



a) an example of a conditional diagram, where: 1 - factors (reasons); 2 - large "bone"; 3 - small "bone"; 4 - middle "bone"; 5 - "ridge"; 6 - characteristic (result).
Figure 4. Example of a causal diagram

Table 17. Accumulated frequencies table

Interval no.	Measured values	Frequency	Accumulated frequency	Accumulated relative frequency

Based on the control sheet, a histogram is built (picture 9), or, with a large number of measurements, the density distribution curve probabilities (figure 5).

A histogram is a bar graph and is used to visualize the distribution of specific parameter values by frequency of occurrence over a certain period of time.... When plotting the allowable values of the parameter, you can determine, how often this parameter is in or out of range...

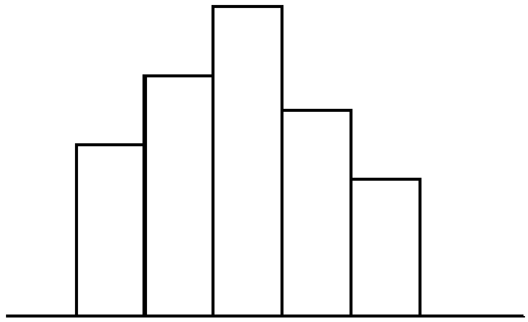


Figure 5. An example of data presentation in the form of a histogram

When examining the histogram, you can find out, whether the batch of shoes and the technological process are in a satisfactory condition... Consider the following issues: what is the distribution width in relation to the tolerance width; what is the center of the distribution in relation to the center of the tolerance band; what is the form of distribution...

6) Scatter plot (scatter)used to identify addiction (correlations) some indicators from others or to determine the degree of correlation between n data pairs for variables x and y: (x1, y1), (x2, y2), ..., (xn, yn).

This data is plotted (scatter chart), and for them the correlation coefficient is calculated, examples of graphs are shown in Figure 6.

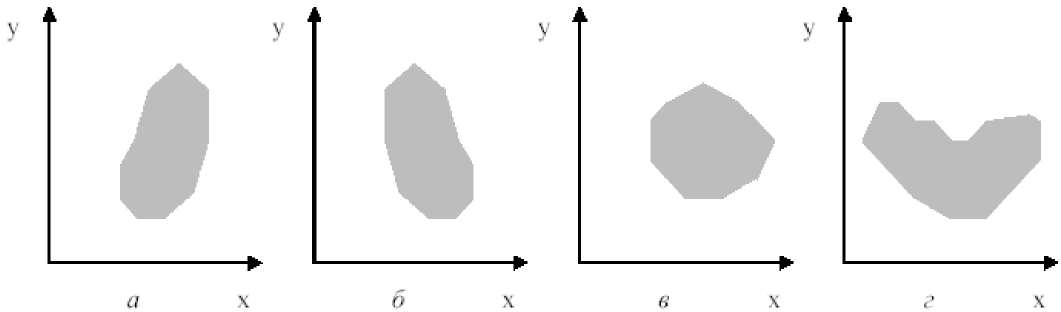


Figure 6. Scatter plots

When:

a) we can talk about a positive correlation (with increasing x, y increases);

b) a negative correlation appears (with increasing x, y decreases);

v) with increasing x → y can both increase and decrease, which indicates the absence of correlation. But this does not mean that there is no relationship between them, there is no linear relationship between them. An obvious nonlinear (exponential) dependence is also shown in the scatter diagram (d).

The correlation coefficient always takes values in the interval $-1 \leq r \leq 1$ those. with r> 0 - positive correlation, with r = 0 - no correlation, with r <0 - negative correlation.

7) One way to achieve satisfactory quality and maintain it at this level is the use of control charts., which represent a graphical representation of the average value of the controlled parameter and the limit of permissible variability, i.e. regulation boundaries. In the course of the technological process, the values of the controlled parameter (in the form of points) obtained as a result of sampling are plotted on the map, and the state of the technological process is judged by their location relative to the regulation boundaries. Essentially, the control chart represents the confidence interval of the time series estimate, i.e. a number of chronologically arranged quality indicators, and the regulation limits are the significance levels taken with the corresponding standard deviation coefficients. The significance level is the probability that the controlled parameter will go outside the limits. With an established technological process, the statistical distribution of quality indicators,

Depending on the type of control, two groups of control charts are distinguished: according to quantitative and qualitative characteristics. The first group includes control charts used in the control and regulation of quantitatively measured parameters of products (length, width, thickness, weight, etc.). The resulting distributions of parameters in almost all cases obey the normal distribution of random variables. The most common maps are: arithmetic mean values, standard deviations, medians and ranges.

The choice of the type of control chart for a given technological process depends on which parameter is influenced by systematic causes (disturbances). If systematic causes (wear of the cutting tool) lead to a bias in the mean values, it is advisable to use control charts for the mean. If systematic reasons lead to an increase in the spread of parameter values, then it is advisable to use a control chart of standard deviations; if at the same time there is a shift in the arithmetic mean and an increase in the spread, then it is advisable to apply simultaneously two types of control charts.

The second group includes maps used in the control and regulation of a qualitative attribute, i.e. an alternative feature, when products are divided into two categories - suitable and unsuitable. The most common control charts for an alternative attribute are: control charts for the proportion of defects; control charts of the number of defective products; defect checklists.

To determine the boundaries of regulation and build control charts, a preliminary study and analysis of the technological process is assigned, the purpose of which is to establish the causes of changes in the quality indicator, and, if possible, eliminate them or reduce their influence, as well as determine the statistical regularities of the process and their numerical characteristics. The duration of the period of preliminary study and analysis of the technological process, depending on the complexity of its nature, can be from two to three months. When maintaining control charts, the exit of some values of the controlled parameter beyond the regulation limits is possible in two cases:

– the outlier value may refer to the general population, but goes beyond the regulation boundary based on the chosen statistical reliability; this means that the established regulation limits are narrower than the limits of natural variability. In this case, it is not recommended to interfere with the technological process;

– the value has gone beyond the boundaries as a result of any changes in the processing mode of objects of labor or in equipment; therefore, it refers to a different general population, and going beyond the regulation boundaries is not accidental. Based on this, it is necessary to investigate the cause of the process disturbance and eliminate it.

To distinguish these cases, it is necessary to analyze the state of the technological process in the previous period of time. If the previous values of the investigated parameter are quite close to the regulation limit or there is a tendency for individual values to approach the regulation limit, then it is likely that the process proceeds with systematic deviations. If the previous values are randomly scattered between the upper and lower limits of regulation, then most often the deviation is random.

The state of the process is monitored according to the developed statistical regulation maps. Depending on the length of time that the process is in a steady state, a control plan is developed, which provides for the frequency of control, the volumes of samples or samples to be recovered, and measures to bring the technological process into an adjusted state. An example of a control chart is shown in Figure 7.

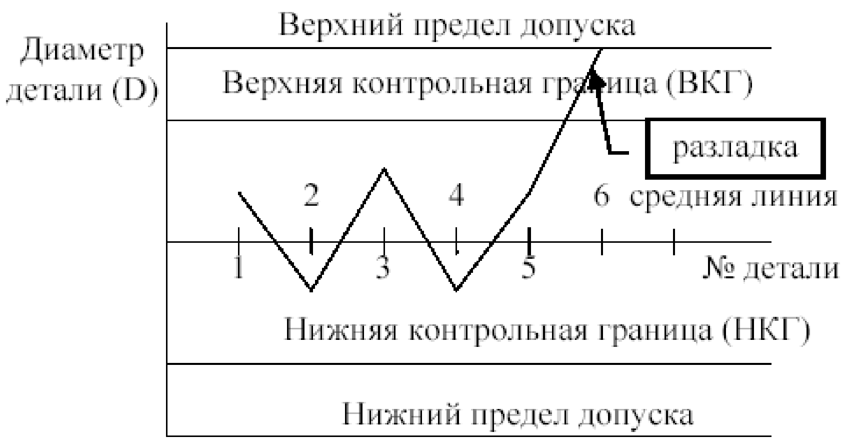


Figure 7. Example of a control chart

Thus, the purposes of using checklists can be:

– identification of an uncontrolled process;
– control over the controlled process;
– process capability assessment...

In various parts of the shoe production, it is necessary to check the quality of a large amount of raw materials, materials and semi-finished products moving in batches. In this case, the so-called continuous control is widely used. Complete inspection is costly, since the quality of each product in the batch is checked, so it is uneconomical.

Sampling control is more expedient and economically justified, which allows, by checking the quality of products in a sample, to obtain information about the entire batch, i.e. whether the quality of a given batch meets the established standards. The term "product" is used in statistical control in a broad sense. A product means raw materials and basic materials coming from suppliers, semi-finished products transferred from one site to another, parts, finished products. Sampling control is based on the law of large numbers, which makes it possible to assert that if the general population obeys a certain distribution law, then the sample from this population also obeys the same law (of course, provided that the sample size is not less than a certain certain level). The main task of statistical sampling is to reject lots in which the number or proportion of defective products exceeds the allowable limit established for a streamlined production process. In sampling, there is always a certain probability that a lot containing no defective products greater than the allowable limit will not be accepted or that a lot containing defective products will be accepted. However, continuous control is not free from errors. It does not at all guarantee that the quality of all tested and accepted products meets the established standard. This is confirmed by the experience of enterprises in various industries, both domestic and foreign. This is explained by the fact that the controller gets tired of performing monotonous operations, due to with which his observation and attentiveness decrease, vigilance is dulled. As a result, defective products are missed as high quality. The experience of enterprises shows that only six-fold complete control can guarantee that the defective product does not fall into the batch accepted after the inspection. When constructing an acceptance control plan, first of all, the average quality level of the accepted lots is set, i.e. the proportion of defective products on average in accepted lots, and is called the level of average output quality. Then the task is already reduced to choosing the type of control and control parameters: the sample size and the maximum allowable number of defective products in the sample, at which the supplier's and consumer's risk are guaranteed at levels of 5 and 10%, respectively. Statistical acceptance control can be carried out with or without grading. When inspecting with grading, an unaccepted lot is subjected to a continuous inspection with the replacement of defective products with suitable ones. Inspection with grading improves the quality of products, since it is better than the quality of incoming lots. The average output quality is higher than the average input quality of batches.

Various types of control are known: single-stage, two-stage and multi-stage. In a one-stage plan, a sample of n items is taken from a batch of N items and the quality of each is checked. If the number of defective items does not exceed the allowed limit, the batch is accepted, and vice versa. If the inspection is with grading, then the rejected lot is sent to 100% grading, i.e. for complete control with the replacement of unusable products with suitable ones. In the case of two-stage inspection, a sample of volume n1 is extracted from a batch of N items received for inspection, which is most often 2/3 or ¾ of the sample size n in case of one-stage inspection. The quality is checked and the number of defective items is identified. If the batch is not accepted, then it is sent to 100% grading.

Multi-stage control is like a continuation of two-stage control. The maximum number of resamples, i.e. steps, set by a certain number. With multi-stage control, the final conclusion about the quality of the batch can be made at one of the intermediate stages. The amount of control turns out to be random. The choice of the type of control is determined by the specific production conditions: the nature of the technological process, the type of product, the organization of their movement and quality, the stability of the technological process. In this case, the qualifications of the developers are of great importance, as well as the training of persons who will apply the statistical acceptance control.

It is also recommended in the shoe industry to use methods thatserve to research information when the change in the analyzed parameter is random. The main methods included in this group are: regressive, variance and factorial types of analysis, method for comparing means, method for comparing variances, etc.

These methods allow: to establish the dependence of the studied phenomena on random factors, both qualitative (analysis of variance) and quantitative (correlation analysis); explore the relationship between random and non-random variables (regression analysis); identify the role of individual factors in changing the analyzed parameter (factor analysis), as well as the use of economic and mathematical methods, which are a combination of economic, mathematical and cybernetic methods. The central concept of the methods of this group is optimization, that is, the process of finding the best option out of the set of possible ones, taking into account the adopted criterion (optimality criterion). Strictly speaking, economic and mathematical methods are not purely statistical, but they widely use the apparatus of mathematical statistics, which makes it possible to include them in the considered classification of statistical methods. For purposes related to quality assurance, from a fairly extensive group of economic and mathematical methods, the following should be distinguished first of all: mathematical programming (linear, nonlinear, dynamic); planning an experiment; simulation modeling: game theory; queuing theory; scheduling theory; functional cost analysis, etc. This group can include both Taguchi methods and the Quality Function Deployment (QFD) method. dynamic); planning an experiment; simulation modeling: game theory; queuing theory; scheduling theory; functional cost analysis, etc. This group can include both Taguchi methods and the Quality Function Deployment (QFD) method. dynamic); planning an experiment; simulation modeling: game theory; queuing theory; scheduling theory; functional cost analysis, etc. This group can include both Taguchi methods and the Quality Function Deployment (QFD) method.

Examples of possible application of the considered methods for solving some problems in the quality system at the stages of the product life cycle are shown in Table 18.

Table 18. Application of statistical methods at stages of the product life cycle

Product life cycle stages	Tasks solved in the quality system	Statistical Methods
1	2	3
1.Marketing and Market Research	1.1 Research and assessment of market demand and the prospect of its changes	Methods for the analysis of statistical aggregates, economic and mathematical (dynamic programming, simulation, etc.)
	1.2 Analysis of the wishes of consumers in relation to the quality and price of products	Economic and mathematical methods (QFD), etc.
	1.3 Forecasting price, output, potential market share, life expectancy of products in the market	Economic and mathematical methods (theory of mass service, game theory, linear and nonlinear programming, etc.)
2.Product design and development	2.1 Standardization of requirements for product quality. Determination of technical requirements in the field of reliability. Optimization of the values of the product quality indicator. Assessment of the technical level of products	Graphic methods (Ishikawa diagram, Pareto chart, histogram, etc.): methods for analyzing statistical populations; economic and mathematical methods (Taguchi methods, QFD)
	2.2 Testing of prototypes or pilot batches of new (modernized) products	Graphical and analytical methods (histogram, layered histogram, etc.), methods for analyzing statistical populations (methods for testing statistical hypotheses, comparing means, comparing variances, etc.): economic and mathematical methods (experiment planning)
	2.3 Ensuring product safety	Economic and mathematical methods (simulation, probability trees, etc.)
3.Purchasing	3.1 Formation of plans for providing enterprises with material and technical resources of the required quality	Economic and mathematical methods (queuing theory, linear programming, etc.)
	3.2 Supplier Capability Assessment	Economic and mathematical methods (systems analysis, dynamic programming, etc.)
	3.3 Timely provision of supplies of material and technical resources	Economic and mathematical methods (queuing theory)
	3.4 Reducing the cost of material and technical support of product quality	Economic and mathematical methods (Taguchi methods, functional and cost analysis, etc.)
4.Production	4.1 Development of technological processes	Economic and mathematical methods (Taguchi methods); scatter plots, etc.); methods of analysis of statistical populations (variance, regression and correlation types of analysis, etc.)
	4.2 Ensuring the accuracy and stability of technological processes	Methods for statistical assessment of the accuracy and stability of technological

		processes (histograms, accuracy diagrams, control charts)
	4.3 Ensuring the stability of product quality during production	Methods of statistical regulation of technological processes (accuracy diagrams, control charts)
5.Control and testing	5.1 Compliance with metrological rules and requirements in the preparation, execution and processing of test results	Graphical methods (histogram, scatter plot, etc.); methods for analyzing statistical populations (methods for testing statistical hypotheses, comparing means, comparing variances, etc.)
	5.2 Identification of products whose quality does not meet the established requirements	Statistical acceptance control methods
	5.3 Product quality analysis	Graphical methods (Ishikawa diagram, Pareto diagram, Pareto diagram stratification, etc.), economic and mathematical methods (functional and cost analysis, QFD)
6.Packaging and storage	6.1 Analysis of compliance with requirements for packaging and storage of products at the enterprise	Statistical acceptance control methods; economic and mathematical methods (queuing theory)
7. Sales and distribution of products	7.1 Ensuring the quality of product transportation	Economic and mathematical methods (linear programming, queuing theory)
8.Installation and commissioning	8.1 Analysis of product quality during installation and commissioning	Graphical methods (time series graph, etc.); methods of analysis of statistical populations (factor analysis, etc.)
	8.2 Analysis of costs to consumers in the use of products	Economic and mathematical methods (Taguchi methods, functional and cost analysis, QFD)
9.Technical service assistance	9.1 Organization of warranty repair of products Organization of timely delivery of spare parts	Economic and mathematical methods (queuing theory, linear programming, etc.)
10.After-sales activities	10.1 Analysis of product failures and other nonconformities	Graphical methods (time series graph, etc.); methods of analysis of statistical populations (factor analysis, etc.)
11.Disposal after use	11.1 Investigation of the possibility of using products of inadequate quality or at the end of their service life	Economic and mathematical methods (functional and cost analysis, QFD, etc.)

You should start mastering statistical methods with the use of simple and accessible ones, and only after that move on to more complex methods. Taking into account the difficulties of mastering statistical methods in industrial practice, it is advisable to subdivide these methods into two classes: simple and complex methods. When choosing statistical methods, they strive to ensure that they correspond to the nature of the production process, the availability of measuring instruments and processing of statistical information. Since several different statistical methods can be selected to solve a specific production problem, the one that will provide the best result at the lowest cost is selected.

In order to make a conclusion about the true quality of shoes, they are tested in testing laboratories.

The purpose of testing footwear is to obtain objective and reliable information on the compliance of footwear quality with the requirements of regulatory and technical documentation. The main tasks of the tests are: prevention of putting into production constructively and technologically unfinished shoe models; ensuring the stability of the quality of shoes. Tests are carried out at various stages: development, manufacture (repair) and operation of footwear. The objects of testing are a prototype of the developed shoe model; a sample of footwear specially made for testing; manufactured and repaired footwear. The test classification is shown in Figure 8.

Shoes are subject to acceptance, periodic, type and inspection tests, and during the certification of shoes, also certification tests. Acceptance tests are carried out at the stage of developing shoe models, with the introduction of new materials for the top and bottom of shoes, adhesives, technological processes;

inspection - at the stage of manufacture and operation of footwear. Prototypes of developed shoe models are subject to acceptance tests. Based on the results of acceptance tests, a decision is made on the possibility of introducing new models of footwear, using new materials, etc. or the need to make changes to the footwear to ensure compliance with the requirements and standards established by regulatory and technical documentation. In the presence of negative test results, repeated acceptance tests are carried out. The tests are carried out on re-manufactured shoe samples with corrections made to them. If the results of repeated acceptance tests are positive, the final decision is made on the implementation of the shoe model and the technical and technological documentation is corrected. Periodic tests are carried out to control the stability of the quality indicators of footwear manufactured in small batches. In case of unsatisfactory test results, measures are taken to eliminate the shortcomings that affect the deterioration of the footwear quality indicators. Periodic tests are carried out to control the stability of the quality indicators of footwear manufactured in small batches. In case of unsatisfactory test results, measures are taken to eliminate the shortcomings that affect the deterioration of the footwear quality indicators. Periodic tests are carried out to control the stability of the quality indicators of footwear manufactured in small batches. In case of unsatisfactory test results, measures are taken to eliminate the shortcomings that affect the deterioration of the footwear quality indicators.

Shoe manufacturing is stopped until satisfactory results of physical and mechanical tests are obtained.

Type tests are carried out when changes are made to the operating modes and the technological process; when introducing new technological equipment that affects the quality of footwear. Samples of footwear specially made for testing are subjected to type tests.

Inspection tests are carried out to check the quality indicators of footwear, massive deviations from the requirements and norms established in the NTD, as well as in the presence of a large number of complaints and returns from customers of footwear that did not meet the warranty period. Inspection tests are carried out on samples of footwear specially made for testing, finished footwear, selected in a random order from footwear made by order of the population (for non-destructive tests), or from a small batch (for destructive tests). If the results of the inspection tests are negative, an action plan is drawn up to eliminate the identified deficiencies, the quality control of shoes repaired and manufactured according to the orders of the population is tightened, and the manufacture of shoes in small batches is stopped.

During certification tests of men's and women's shoes, the following quality indicators are determined:

– flexibility of the shoe;
– the strength of the fastening of parts of the bottom of the shoe;
– the strength of the fastening of the heels.

For children's shoes:

– general and permanent deformation of the toe cap and heel counter;
– weight of shoes;
– flexibility of the shoe;
– the strength of the fastening of the bottom parts of the shoe.

In addition to the above indicators of the quality of footwear, during acceptance tests of prototypes of footwear, as well as technical control of the quality of manufactured footwear, the linear dimensions of footwear and its parts are checked.

When developing new models of footwear (during acceptance tests), the mass, flexibility and linear dimensions of the footwear must be determined without fail. The rest of the indicators are determined in the development of new types of footwear, in the development of new basic and auxiliary materials, fastening methods, technological processes.

To determine the above listed quality indicators of footwear, the following equipment is used: tensile testing machine, device ZhNZO-2, special devices for tensile testing machine, scales.

To determine the total and residual deformation of the toe cap and heel counter, the ZHNZO-2 device is used.

To determine the fastening strength of the heel, a device for determining the fastening strength of the middle and high heel is used, which is fastened to the tensile testing machine.

To determine the strength of the fastening of the bottom parts, use a tensile testing machine with a special aptitude.

A shoe flexibility test fixture is used to determine the flexibility.

1) Determination of the total and permanent deformation of the toe cap and heel counter - in accordance with GOST 9135-73.

Shoes must be ripped before testing. Jean in conditions of normal relative humidity (65 ± 5%) and temperature (20 ± 3 ° C) for at least 24 hours.

The device should be installed on the table, the rod with weights - in the upper position. Determination of the total and residual deformation of the back of shoes of all types is carried out with a loadeight kg, for children and little children - 5 Kg... The size of the load when determining dividing the total and residual deformation of the toe of men's and boy's shoes should be 8 Kg...

Each test half pair of shoes is marked in order number on the running surface of the sole.

Before testing the heel of the shoe, pomeThe metal liner is removed and by spreading the sides of the liner, the inner part of the shoe is adhered to the liner.

On the lateral surface of the backdrop, point O is marked, to which forces should be applied. Point O should be located at an equal distance from the back seam of the workpiece and the end of the heel wing (line AB), and also at an equal distance from the upper edge of the heel C and its edge, at the sole D.

The point of application of the load X for the toe test shall be located on the median longitudinal line of the toe, equidistant from the edge of the toe B and the edge of the pulling edge A.

When determining the total and residual deformation of the backing, the half-pair is fixed in the device and installed on the plate of the device. A ball tip is lowered to point O. Turn the small indicator hand to set the They are divided in divisions of at least 5. The indicator reading is recorded. Then, by smoothly turning the handle 90 ° clockwise, the corresponding load is applied to the tip with the ball segment, which is pressed into the surface of the heel of the shoe.

The shoes are kept under load for 30 s and the indicator reading is re-recorded. By turning the handle counterclockwise by 90 °, the load is removed, the spherical segment with the rod is removed from the test shoe and fixed in the upper position with the handle.

After 3 minutes, the rod with the ball segment is lowered with a handle onto the same point of the heel of the test shoe and the indicator readings are again noted.

At the end of the test on the heel on one side, the half pair of shoes is removed from the fixture, turned and reinforced again for testing on the other side and in the same sequence.

When determining the total and residual deformation of the toe, a half-pair of shoes is fixed in the device in such a way that the heel of the shoe is located inside the staple. From the set of stands supplied with the device, a stand with a contour corresponding to the style of the heel and dimensions that ensure tight fixing of the heel in the bracket is selected and inserted into the bracket. Depending on the elevation of the toe of the shoe, the position of the platform is adjusted with a retainer.

The device with a pair of shoes fixed to the floor is installed on the plate of the device so that the toe of the shoe is under the tip with the ball segment.

Further testing is repeated.

The position of a fixed, semi-pair of shoes shall remain constant throughout the test.

The indicator of the total deformation of the toe and heel is the difference between the initial reading of the indicator and the reading after a load has been applied for 30 s.

General deformation of the toe and heel ($Д_{общ}$) in millimeters is calculated by the formula:

$$Д_{общ} = Д_1 - Д_2, \qquad (1)$$

where $Д_1$ - initial indication of the indicator (before loading), mm;

$Д_2$ - indicator reading after loading for 30 s, mm.

The indicator of the permanent deformation of the toe-cap and the counter is the difference between the initial reading of the indicator (before loading) and the reading 3 minutes after the load is removed.

Permanent deformation of the toe and heel ($Д_{ост}$) in millimeters is calculated by the formula:

$$Д_{ост} = Д_1 - Д_3, \qquad (2)$$

where $Д_1$ - initial indication of the indicator (before loading), mm;

$Д_3$ - indicator reading 3 minutes after removing the load, mm.

The total and permanent deformation of the backdrop is determined as the arithmetic mean of the test results of the backdrop from the outside and inside.

2) Determination of the heel attachment strength - in accordance with GOST 9136-72.

Sampling is carried out in accordance with GOST 9289 - 59.

Equipment: a device for determining the strength of the fastening of a medium and high heel consists of two nodes: pliers, which are a lever for gripping the heel, and a device for fastening shoes. The shank of the pincers is fixed in the upper clamps of the tensile testing machine, and the shoe securing device is mounted on the screw shaft instead of the lower clamps.

The device for securing shoes consists of a metal shoe and two movable cheeks, the distance of which from the shoe is adjusted with screws. The shoe is installed on a bracket guide, along which it can move in the horizontal direction and be fixed with a screw in the required position. A tightening screw is attached to the bracket, which has a nut at one end and a toothed washer at the other. A lug is put on the tightening screw, the other end of which is attached instead of the lower clamps to the rod of the tensile testing machine. The toothed clutch of the eyelet of the eyelet and the washer allows the block attached to the bracket to be rotated at the required angle relative to the rod of the tensile testing machine.

The separation of the heel is carried out on a tensile testing machine with the help of devices. The lowering speed of the lower clamps should be 50mm per minute. The ultimate load of the tensile testing machine according to the corresponding scale should not exceed the breakout load by more than 10 times.

Test preparation: n Before testing, each half-pair of shoes is marked with a serial number in any way in two places: on the running or lateral surface of the heel and on the top. In the presence of a crocodile sole, it is separated from the heel before testing. A small groove with a depth is made in the sample of low-heeled shoes to be tested along the line of separation between the sole and heel using a knife.2 mm...

Testing: To test the strength of the fastening of a low heel, shoes, with the heel facing up, are brought to the lower jaws of the device, which, when the handle is rotated clockwise, grip the sole. Then, the lower bracket is lifted together with the shoes to the level of the jaws of the upper bracket and, by rotating the handles of the upper bracket, its lips are brought together until the grip or heel is along the groove line. After installing the shoes in the device, the jaws of the upper and lower braces must be brought to contact and only then the machine must be started. During the detachment of the heel, it is necessary to additionally bring the upper and lower jaws of the device closer together to avoid slipping of the sample, since at the beginning, when the sample is fixed, the contact surface of the sponges with the surface of the sole and heel is insignificant. For testing the fastening strength of medium and high for whom the shoes are put on the block of the device and, with the help of movable cheeks and screws, are firmly fixed in the heel area. When pulling off a medium to high heel, the pulling force should be applied at an angle of 750 to the heel area. The angle of rotation is determined by the risk applied to the surface of the washer head; a turn of the lug by one tooth corresponds to a turn of the block by 150.

3) *Determination of the fastening strength of the bottom parts - in accordance with GOST 9134-78 and GOST 9292-82.*

Sampling is carried out in accordance with GOST 9289 - 78.

Applied devices

The test is carried out on a tensile testing machine with a special aptitude. The power of the machine should not exceed the load timescollapse by more than 10 times. The lower clamps must move with speed. height 200 mm / min. The device is a pair of hinged pliers, the shanks of which are fixed in the upper and lower clamps of the tensile testing machine. The length of the jaws of the pliers is40 mm... The pliers have 2 screws that adjust the distance between the jaws of the pliers.

Samples from the bottom of the shoe are cut in such a way that each of them includes all the elements that form the fastening, i.e. outsole, lining or edging, insole and pulling hem. Sample must be long40 mm, and its width can fluctuate Xia depending on the distance of the attachment line from the edge of the sole, because the seam should be located along the sample approximately in its middle. AboutBefore testing, the samples shall be conditioned to constant weight under normal conditions of temperature and relative humidity.

Testing

The test specimens are loaded into the pliers so that the jaws of the lower pliers grip the edges of the plantar layer of the specimen, and the jaws of the upper pliers - the edges of the insole of the specimen together with the tightening edge.

Calculation of test results

Strength q, in N / cm (breaking strength at 1 cm attachment length) is determined by the formula:

$$q = \frac{P}{l}, \qquad (3)$$

where P is the load at seam rupture;
l is the length of the sample.

4) Determination of flexibility - according to GOST 9718-88.

Shoes must be ripped before testing. Jean in conditions of normal relative humidity (65 ± 5%) and temperature (20 ± 2 ° C) for at least 48 hours.

On each half-pair to be tested a bending (fastening) line is drawn perpendicular to the longitudinal axis of the track at a distance of 0.67 of the length of the foot from the edge of the heel of the shoe.

On distance 60 mm from the line of bending (fastening) of the shoe towards the toe, parallel to it, draw a line of application of the bending force.

The shoe flexibility tester is clamped into a tensile testing machine. The tested half-pair of shoes is fixed in the device so that the downforce acts along the bending line. The toe bending device is positioned along the line of the bending force.

The tensile testing machine is activated and the stop is brought up to contact with the running surface of the sole. The elongation scale is set to zero.

By reactivating the tensile machine, the shoes are bent. When the elongation scale reaches25 mm, which corresponds to the bending of the shoe at an angle of 25 °, the machine is stopped and the value of the applied force is noted on the scale of loads.

On one half pair, four of measurements with an interval of no more than 3 minutes.

When carrying out tests, it is necessary to observe the established lent rules for the exploitation of tensile machines.

Installation and removal of samples is carried out with the machine turned off.

The flexibility of the shoe is expressed by the force in Newtons, measured on the fourth-dimensional load scale.

5) Determination of footwear mass in accordance with GOST 98735-2005.

For testing footwear (except for special ones), laboratory scales are used in accordance with GOST 24104-2004 of high accuracy class (2) with the maximum weighing limit of 2 kg or other scales that are not inferior to them in accuracy. Permissible weighing error ± 1 G.

For testing safety footwear, a mechanical or electronic balance with a maximum weighing limit of up to 15 Kginclusive, manufactured according to a normative document, approved in accordance with the established procedure. Additional weighing error ± 5 G.

Sampling in accordance with GOST 9289-78. The sample should consist of shoes of the same size (initial for a given age and gender group) and the same fullness.

To determine the mass, a half pair of shoes is weighed on a balance with an accuracy of 1 g...

The test result is taken as the value obtained by weighing each half pair of shoes, expressed in grams. In accordance with GOST R 51000.3-96 "General requirements for testing laboratories" the following requirements are imposed on testing laboratories:

– testing laboratories and their personnel should not be subject to commercial, financial, administrative or other pressures that may influence conclusions or estimates. Any influence on the test results by external organizations or persons should be excluded;

– the remuneration of the personnel assigned to carry out the tests should not depend on the number of tests and their results;

– the testing laboratory must be competent to carry out the relevant tests. In the absence of an established test method, an agreement must be documented between the customer and the laboratory on the test method to be used;

– the testing laboratory must have: an organizational structure that provides for each employee a specific area of activity and the limits of his authority (duties and responsibilities); a technical manager who is responsible for all technical tasks related to testing; documented Regulations containing a description of the organization of the laboratory's activities, the distribution of responsibilities of employees, as well as other information about the organization of the laboratory's work (functions performed, interaction with other organizations, etc.);

– The testing laboratory shall conduct an internal audit to assess its conformity with the requirements of this standard. The inspection should be carried out by competent persons familiar with the test methods, their objectives and the evaluation of the results;

– for each specialist there must be a job description that establishes functions, duties, rights and responsibilities, qualification requirements for education, technical knowledge and work experience;

– specialists and experts directly involved in conducting tests and evaluations must be certified in accordance with the established procedure for the right to conduct them;

– the testing laboratory must be equipped with equipment, as well as consumables (chemicals, substances, etc.) for the correct testing and measurements, which is required to recognize its competence. In exceptional cases, it is possible to use equipment that does not belong to the laboratory on a contractual basis, provided that this equipment is certified and the measuring instruments are verified in accordance with the established procedure;

– test equipment, measuring instruments and measurement techniques must comply with the requirements of the standards of the state system for ensuring the uniformity of measurements, regulatory documents for test methods;

– the environment in which the tests are carried out should not adversely affect the results and distort the required measurement accuracy. Rooms for testing must be protected from the effects of such factors as high temperatures, dust, humidity, steam, noise, vibration, electromagnetic disturbances, and meet the requirements of the applied test methods, sanitary norms and rules, labor safety and environmental protection requirements. The premises should be spacious enough to eliminate the risk of damage to equipment and the occurrence of dangerous situations, to provide employees with freedom of movement and accuracy of actions;

– Test rooms should be equipped with the necessary equipment and energy sources and, if necessary, devices for regulating the conditions in which the tests are carried out. Access to and use of test areas should be appropriately controlled; the conditions for the admission of persons not related to the personnel of this laboratory should also be determined;

– Defective equipment that gives questionable test results should be taken out of service and labeled appropriately to indicate that it is unusable. Such equipment should be stored in a specially designated place until it is repaired and its suitability is confirmed by tests (verification, calibration);

– each piece of equipment for testing or measurement must have a registration card containing the following information: name of equipment; name of the manufacturer (firm), type (brand), serial and inventory number; dates of receipt and commissioning; location at present - if necessary; condition at the time of receipt (new, worn, extended, etc.); repair and maintenance data; a description of any damage or failure, alteration or repair. Calibration of measuring and test equipment, if necessary, is carried out before putting it into operation and further in accordance with the established program;

– model substances should, where possible, be monitored for compliance with national or international standards for model substances;

– the testing laboratory must have the necessary documentation for the operation and functioning of the relevant equipment, for handling the tested products and preparing them for testing (if necessary);

– the testing laboratory must use the methods and procedures established by the standards and (or) specifications in accordance with which the products are tested. These documents should be at the disposal of the personnel responsible for conducting the tests;

– if non-standardized test methods and procedures have been used where necessary, the laboratory shall fully record this;

– the laboratory must have an internal quality system corresponding to the scope of accreditation of the testing laboratory;

– elements of this system should be included in the Quality Manual provided for use by laboratory personnel. The updating of the Quality Manual is the responsibility of the responsible employee of the laboratory;

– When preparing the test report, special attention should be paid to the presentation of the test results and the elimination of difficulties in their perception by the user. The content of the protocol for each type of test carried out may differ, but the headings should be standardized;

– quantitative results should be presented with an indication of the calculated or estimated error;

– the testing laboratory must have a system for recording test results that complies with the established rules and ensures the registration of initial observations, calculations, derived data, verification reports and the final test report within a specified period. The records of each test should include the necessary information to enable satisfactory retests to be carried out. Registration includes data on testing and sample handling personnel;

– product samples submitted for testing must be identified for compliance with regulatory documents and accompanied by an appropriate selection protocol;

– at all stages of storage, transportation and preparation of products for testing, take the necessary precautions to prevent damage to products as a result of contamination, corrosion or excessive loads that adversely affect the test results;

– receipt, storage, return (or disposal) of samples are carried out according to clearly established rules;

– the staff of the testing laboratory must keep professional confidentiality in relation to information obtained in the performance of their functions;

– the testing laboratory must have a clearly defined complaint procedure, which must be documented and provided at the request of the customer;

– the testing laboratory shall assist the accrediting body and its representatives in the control of compliance with the requirements In accordance with GOST R 51000.3-96 "General requirements for testing laboratories" and other additional requirements. This assistance includes: providing the representative with access to the appropriate premises of the testing laboratory to monitor the progress of the tests; Conducting proof tests that allow the accrediting body to verify the laboratory's suitability for testing; participation in an appropriate laboratory quality assurance or interlaboratory comparison program that may be organized by the accrediting body; providing the accrediting body with the opportunity to familiarize itself with the results of its internal laboratory tests; submission to the accrediting body of information on the activities of the testing laboratory;

– an accredited testing laboratory must: meet the requirements In accordance with GOST R 51000.3-96 "General requirements for testing laboratories" and other criteria established by the accrediting body; declare accreditation only for those tests that fall within the scope of accreditation; bear the financial costs associated with the submission of the application, membership, participation, evaluation, supervision and other services, periodically determined by the accrediting body, taking into account the corresponding cost; not to use the received accreditation to the detriment of the accrediting body; to cease activities immediately after the expiration date, and also not to invoke accreditation in the laboratory's advertising; in all contracts with customers, indicate that laboratory accreditation or its test reports do not automatically mean that a product (service, process) is approved by the accrediting body or other organization as meeting the established requirements; ensure that the test report or part of the test report is not used by the customer or another party with the customer's permission for their own development or advertising, if the accrediting body considers such use to be incorrect. In any case, the test report cannot be partially reprinted without the written permission of the accrediting body and the testing laboratory; immediately inform the accrediting body of any changes affecting compliance with the requirements of this standard or any criterion defining the competence or scope of a testing laboratory. that the test report or part of the test report is not used by the customer or another party with the customer's permission for its own development or advertising, if the accrediting body considers such use to be incorrect. In any case, the test report cannot be partially reprinted without the written permission of the accrediting body and the testing laboratory; immediately inform the accrediting body of any changes affecting compliance with the requirements of this standard or any criterion defining the competence or scope of a testing laboratory. that the test report or part of the test report is not used by the customer or another party with the customer's permission for its own development or advertising, if the accrediting body considers such use to be incorrect. In any case, the test report cannot be partially reprinted without the written permission of the accrediting body and the testing laboratory; immediately inform the accrediting body of any changes affecting compliance with the requirements of this standard or any criterion defining the competence or scope of a testing laboratory. In any case, the test report cannot be partially reprinted without the written permission of the accrediting body and the testing laboratory; immediately inform the accrediting body of any changes affecting compliance with the requirements of this standard or any criterion defining the competence or scope of a testing laboratory. In any case, the test report cannot be partially reprinted without the written permission of the accrediting body and the testing laboratory; immediately inform the accrediting body of any changes affecting compliance with the requirements of this standard or any criterion defining the competence or scope of a testing laboratory.

As noted earlier, the need to create a center for standardization, certification and quality management really exists, since it is due to the need to ensure and manage the quality of footwear, maintain footwear production at the highest level and enter the international market.

It is recommended that the Center for Standardization, Certification and Quality Management (TsSSiUK) be created as a limited liability company so that the center can maintain and develop itself. Consequently, the center must be registered as LLC "TsSSiUK". The center will be headed by the general director.

The creation of the center is possible on the territory of the Rostov region, since it is here that the largest number of shoe enterprises are concentrated, moreover, it is the Rostov region that is the center of the Southern Federal District.

It would be rational to buy a premise for the center. But it should be borne in mind that the dimensions of the room must be appropriate for the location of the center.

The center should include a testing laboratory, within which tests will be carried out directly, not only certification tests, but also acceptance, periodic, standard and inspection tests, if necessary.

Also in this center it would be rational to create marketing and management departments to expand the range of commercial services provided.

In general, the center should include the following divisions:

- department of standardization;
- certification department;
- testing laboratory;
- quality management department;
- quality management department;
- marketing department;
- Human Resources Department;
- accounting.

The quality management department should be subordinate to the quality management department.

The organizational chart of management of the center for standardization, certification and quality management is shown in Figure 9.

The center is recommended to provide services not only to enterprises within the cluster, but also to other enterprises, whether or not related to the production of footwear. The testing laboratory must expand the list of tests carried out.

In general, the activities of the center should be aimed at maintaining shoe production at a high level, managing the quality of products of the enterprises of the shoe cluster, promoting the creation, implementation and certification of quality management systems of enterprises in accordance with the requirements of ISO 9001: 2015, as well as protecting consumers from low-quality goods. and facilitate the entry of the cluster's products into the international market.

Impact Factor:

ISRA (India) = **6.317**	**SIS** (USA) = **0.912**	**ICV** (Poland) = **6.630**
ISI (Dubai, UAE) = **1.582**	**РИНЦ** (Russia) = **3.939**	**PIF** (India) = **1.940**
GIF (Australia) = **0.564**	**ESJI** (KZ) = **9.035**	**IBI** (India) = **4.260**
JIF = **1.500**	**SJIF** (Morocco) = **7.184**	**OAJI** (USA) = **0.350**

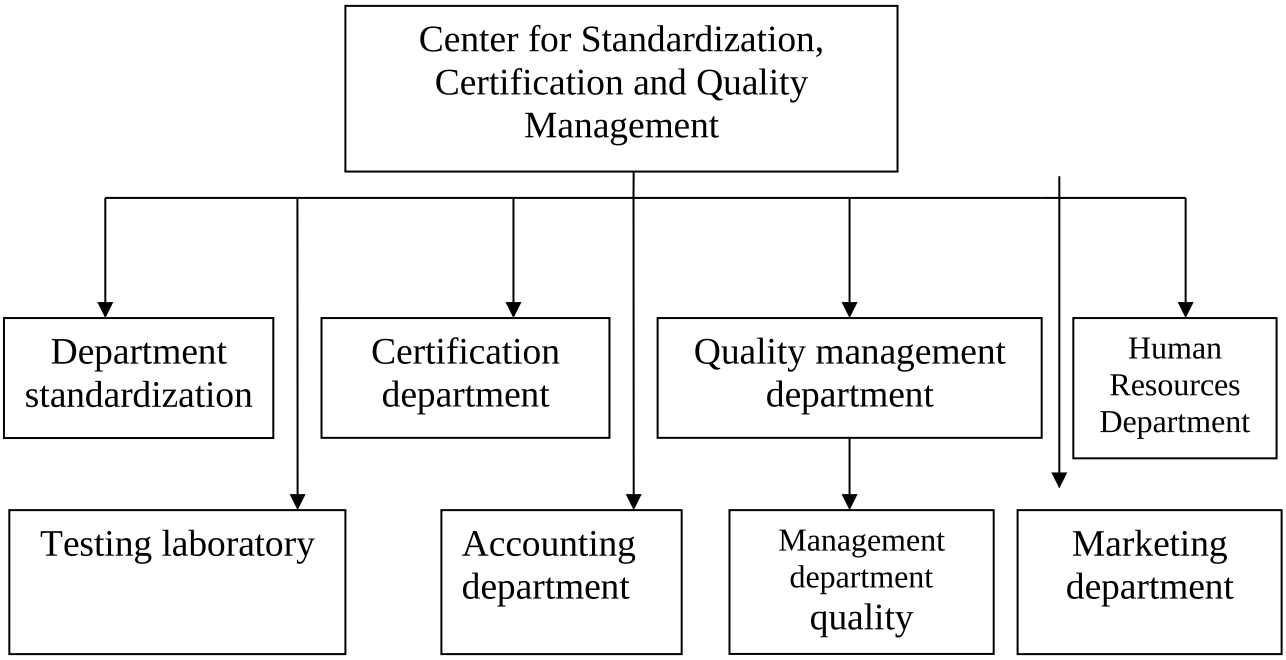


Figure 9. Organizational chart of the center for standardization, certification and quality management

The departments of standardization and certification should cooperate closely, since it is the department of standardization that will have to supply all the necessary normative and technical documentation to the department of certification.

In general, the standardization department will have to assume the following functions:

– maintaining (storing) a fund of normative and technical documentation of a shoe cluster, as well as normative and technical documentation of other spheres of production;

– development of standards of organizations for manufactured footwear, and development of standards of organizations commissioned by other enterprises, whether or not related to the production of footwear;

– carrying out examinations and approval of drafts of normative and technical documents received by enterprises from outside.

The personnel composition of the staff of the standardization department required at the initial stages of the center's functioning is shown in Table 19.

Table 19. Personnel composition of the standardization department

Position	Kind of activity	Education	Work experience
Head of department	Reporting to the CEO, material responsibility, responsibility for the services provided	Higher	At least three years in a similar position
Standardization Engineer (2 persons)	Development of organization standards	Higher	At least two years
Specialist in normative and technical documentation	Examination of incoming documents	Higher	About six months

The role of the certification department in the center will be as follows: based on the tests carried out in the testing laboratory of the center, it will issue GOST R certificates of conformity, register declarations of conformity, prepare exemption letters for customs and for sale, carry out certification of the quality management system for compliance with ISO 9001 requirements : 2015, as well as, together with the standardization department, agree and register the standards of the organizations.

The certification department must be accredited without fail. For this, the certification department will need to send an accreditation application to the Ministry of Labor of Russia, previously agreed upon with the relevant executive authority of the constituent entity of the Russian Federation in charge of labor protection issues, or the central body of the sectoral subsystem of the SSOT.

Simultaneously with the application, the following documents must be sent:

– a copy of the charter or regulations of the organization;

– a certificate of the organization's activities, attesting to its competence in the declared field of activity;

– draft regulation on the certification body;

– a copy of the charter or regulations on the organization (if the certification body is created as part of an organization that is a legal entity);

– information about the employees of the certification body;

– draft quality manual;

– list of organizations interacting with the certification body;

– draft agreement for accreditation;

– draft order on the functioning of the certification body;

– other materials at the discretion of the applicant.

All documents are submitted in duplicate on paper, as well as on magnetic media.

The certification department should include the following employees, the staffing of which is shown in Table 20.

Table 20. Personnel composition of the certification department

Position	Kind of activity	Education	Work experience
Head of department	Responsible for the services provided, provides reporting to the CEO	Higher	At least three years in a similar position
Certification experts (3 persons)	Document analysis, decision making	Higher	From three years
Secretary	Acceptance of applications, issuance of documents	Specialized secondary	Doesn't matter

It should be noted that the certification department must necessarily meet the requirements given in GOST R 51000.5-96 "General requirements for bodies for certification of products and services" (Approved by the Resolution of the State Standard of the Russian Federation (Federal Agency for Technical Regulation and Metrology) dated 02.29.96 N 138).

The testing laboratory plays an important role in confirming the conformity of products, since it is on the basis of the results obtained from the tests carried out in the laboratory that the certification department will decide whether to issue (refuse) a certificate or register a declaration of conformity. The testing laboratory must be accredited without fail. To do this, she will need to apply for non-accreditation and draw up a list of necessary documentation in the form of a table.

This list must include legislative and other regulatory legal acts on labor protection and other documents regulating the activities of the testing laboratory in accordance with the scope of accreditation (including the provision on the procedure for certification of workplaces for working conditions, approved by the decree of the Ministry of Labor of Russia of 14 Martha 1997 year... No. 12 - recognized as not requiring state registration by the letter of the Ministry of Justice of Russia dated April 281997 year... No. 07-02-541-97), regulations on the testing laboratory, quality manual, job descriptions, labor protection instructions, etc.

The tables should contain the following information:

– types of measurements carried out by the testing (measuring) laboratory;

– equipping with measuring instruments (SI);

– staffing of employees.

The personnel composition of the testing laboratory workers required at the initial stage of the testing laboratory functioning is shown in Table 21.

Table 21. Personnel composition of IL staff

Position	Kind of activity	Education	Work experience
Head of IL	Material and technical responsibility, responsibility for the availability of the necessary documentation	Higher	From three years in a similar position

Laboratory assistant (3 people)	Testing	Technical	Doesn't matter
Secretary	Maintaining test reports	Specialized secondary	Doesn't matter

The testing laboratory must necessarily meet the requirements given in GOST R 51000.3-96 "General requirements for testing laboratories."

Tests should be carried out in accordance with the normative and technical documentation and according to the following scheme, shown in Figure 17.

For testing, the laboratory must be equipped with modern testing equipment, namely:

– to determine the flexibility of a shoe - a special device for a tensile testing machine, consisting of a device for attaching the tested semi-pair and a device that bends the toe of the shoe along the bending line at an angle of 25 degrees (a diagram of a special device is shown in Figure 10);

– the strength of the fastening of the bottom parts of the shoe is determined using a tensile testing machine;

– the strength of the fastening of the heels is determined using a special device for a tensile testing machine;

– general and permanent deformation of the toe cap and backdrop is determined using the ZhNZO - 2 device;

– the weight of the shoes is determined on a laboratory balance of the 2nd accuracy class;

– determination of the strength of the seams of the shoe upper blank - tensile machine;

determination of linear dimensions - ruler, thickness gauge

Recommended equipment for testing the following brands and a set of characteristics:

The thickness gauge is designed to measure the thickness of leather, felt, felt and other materials.

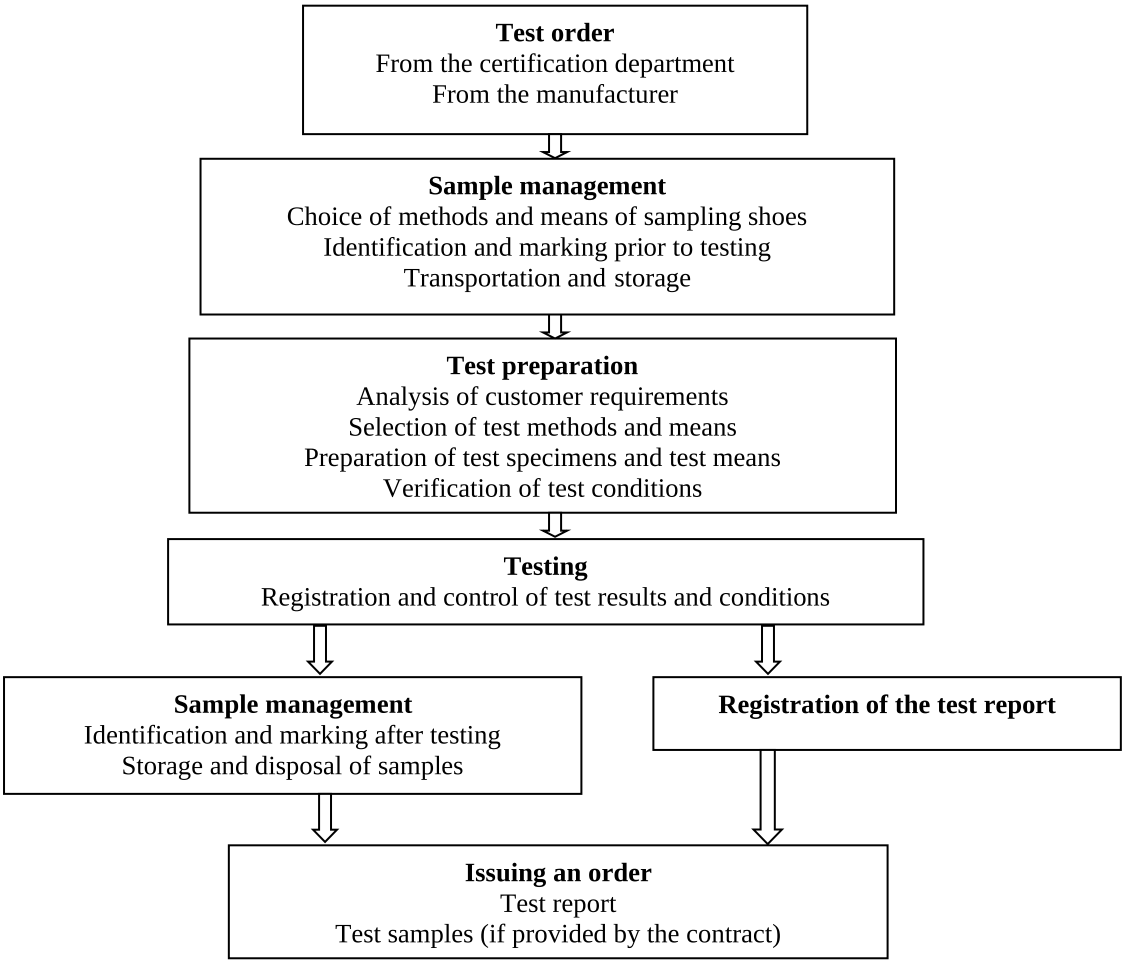


Figure 10. Structure of the certification process tests in IL0

It consists of a bracket, in the upper part of which there is a measuring mechanism, and in the lower part - a heel. A tip is installed on the measuring rod of the indicator. The measuring rod with the tip is raised to the upper position by the lever.Table 22 lists the specifications for the thickness gauge.

Table 22. Specifications

Parameter	Meaning
Measurement limit, mm	0-50
Scale of the indicator, mm	0.1
Departure not less, mm	250
The greatest measuring force, N	3
Limits of the permissible basic absolute error, mm: - in the area from 0 to 1 mm - on the site over 1 mm before 50 mm	± 0.1 ± 0.2
Overall dimensions, mm	370x120x270
Weight, no more, kg	

The technical characteristics of ZhNZO-2 are shown in Table 23.

Table 23. Technical characteristics of ZhNZO-2

Deformation measurement range, mm	0 to 25
Scale division, mm	0.01
Measurement error, mm	$\pm$0.1
Effort of deformation of shoes, kgf	5$\pm$ 0.100 eight$\pm$0.160
Tip radius, mm	17.5$\pm$0.1
Dimensions of the device, mm	$300\times400\times570$
Weight of the device with accessories, kg, no more	40

The machine is designed to determine the deformation and strength characteristics of various materials. The machine is equipped with a quiet, high torque, precision, gearless drive.

Types of tests (using the necessary fixtures):

– stretching;
– compression;
– bending;
– other types of tests.

The scope of delivery is shown in Table 24.

Table 24. Basic supply of tensile testing machine IP 5158

Components	IR5145-500-10	IR5145-500-11
Test setup	+	+
Instrument rack	+	+
Operator panel PO-3	+	+
Grips (type IV, GOST1497)	+	+
Strain gage force meter	+	+
a printer	+	-
Software and hardware complex	-	+

Additional Information:

Execution - desktop. At the request of the customer, the machine can be supplied in the required completeness, fully adapted to the specified methods and specific test conditions, additionally equipped with devices, a computer, a printer (EPSON) and software.

Verification tools are not included in the machine package and can be supplied additionally. The machine provides mathematical processing of test results and displays the following information:

– maximum load, N;
– breaking load, N;
– ultimate strength, MPa (kg / mm 2);
– relative extension, %;
– specific tensile strength, kN / m (kgf / mm);
– tensile strength index; arithmetic mean.

The technical characteristics of the tensile testing machine are shown in table 25.

Table 25. Specifications

Parameter	Parameter values for models	
	IP 5158-0.1	SP 5158-0.5
1	2	3
Type of force meter	strain gage	
Maximum ultimate load, N	100	500
Measurement range of loads with an error of 1% of the measured value	4 - 100	20 - 500
Active gripper movement speed, mm / min	from 1 to 500	
Deviation of speed from the set value, no more,%	± 5	± 5
Division value when measuring displacement, microns	1	1
Height of the working space without grippers and accessories, mm	800	800
Power consumption, kW	0.2	0.2
Overall dimensions, mm	650x500x1200	650x500x1200
Weight, kg	120	120

Table 26. LP 2200S laboratory scale technical characteristics

Parameter	Parameter value
1	2
Functional classification	Professional
Number of weighing ranges	1
Division value, g	0.01
The largest limit of weighing electronic scales, g:	2200
Calibration type	full built-in self-calibration of scales without operator intervention
Accuracy class according to GOST 24104-1988	3
Accuracy class according to GOST 24104-2001	II
Weighing pan design	rectangular open weighing pan

Double-sided caliper with depth gauge ШЦЦ-I with indication of measurement results onliquid crystal digital display, designed to measure external and internal dimensions, intervals, as well as for measuring depths using the absolute method.

Outside measurements are made using the lower jaws, internal measurements are made using “sharp” jaws, and the depth is done using a depth gauge.

An example of a symbol for a digital caliper type SCC-I with measuring range 0-150 mm and the reading value of the liquid crystal digital display 0.01mm:

Vernier caliper ШЦЦ-I-150-0,01.

Double-sided calipers with a depth gauge ШЦЦ-I with indication of measurement results onliquid crystal digital displayare made of carbon and stainless steel, with inch and metric scales. Calipersare made of two types by type stopping: with locking screw and trigger mechanism.

Vernier calipers ШЦ-I according to ISO 9002 or DIN862 are made of carbon steel with chrome plating and stainless steel, with a graduation of 0.01 mm. The hardness of the measuring surfaces of tool and structural steel is not less than 51.5 HRC.

An additional zero setting allows the measurement of relative values.

The electronic unit of the vernier caliper makes it easier to take readings, both in metric units of measurement and in inches.

Battery: Lithium battery 3V CR 2032, current consumption - 18 µA.

There is a possibility of data output to a computer or controller of the automated process control system of the workplace from the electronic unit of the caliper via the RS232 serial interface (COM - port).

Measurement repeatability - 0.01mm.

Execution according to the protection class IP65.

Technical characteristics of calipers are shown in table 27.

Table 27. Technical characteristics of the caliper

Model	Measurement limits, mm (inch)	Readout resolution, mm (inch)	Measurement error, mm (inch)	Weight, kg
ShTsTs-I-150-0.01	0-150 (0-6 ")	0.01 (0.005 ")	± 0.03 (± 0.001)	0.2

The quality management department in the center for standardization, certification and quality management should take the leading place, since it will be he who will have to assume the responsibility for quality management at the shoe factories of the TOP.

The quality management department will have to coordinate all the actions of the technical control departments at enterprises, collect information on the activities carried out, analyze and develop quality improvement tactics specifically for each enterprise, as well as the introduction of new control methods according to the developed program specifically for each enterprise, taking into account the available equipment.

An approximate scheme for the implementation of new control methods can be as follows, shown in Figure 12.

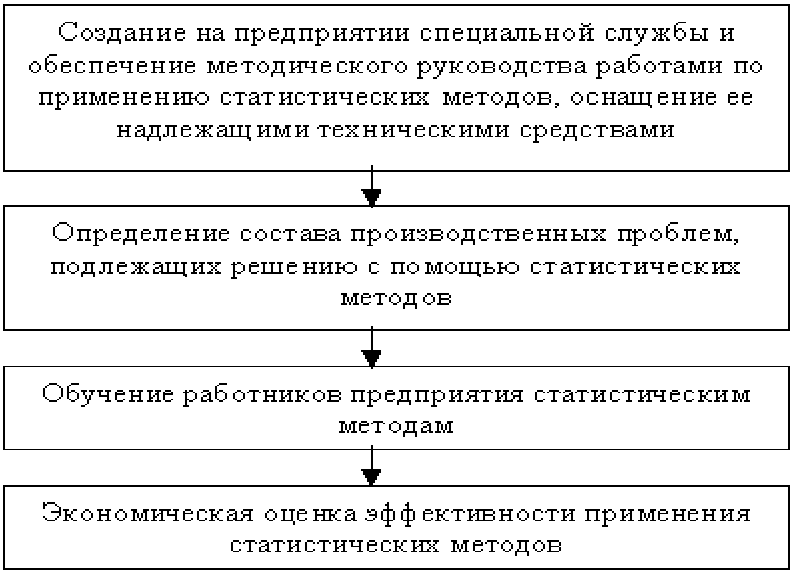


Figure 12. General scheme for the implementation of new control methods

The quality management department will have to have the following staffing, shown in table 28

To carry out all the functions of ensuring and controlling the quality of footwear at enterprises, it would be rational to include a quality management department in the department.

Table 28. Personnel composition of the quality management department

Position	Kind of activity	Education	Work experience
Head of department	Control of departments: management, marketing and advertising, reporting to the CEO	Higher	At least three years in a similar position

Quality Engineer (2 persons)	Implementation of new control methods at enterprises	Higher	From one year
Analyst	Enterprise analysis	Higher	From one year

Hotel quality management should will coordinate the activities of all divisions of enterprises for the development and implementation of a quality management system (QMS) in the following stages:

– development of a draft quality management policy;

– development of a plan for creation and implementation;

– development and implementation of the organizational structure of the QMS;

– development of proposals for work with personnel (professional development and certification of personnel);

– development of QMS documentation, including the necessary forms and records, documented procedures, Quality Manual, in conjunction with quality authorized and quality groups of enterprises;

– streamlining of work processes in production, determination of measured parameters and characteristics of their quality, methods of their measurement and collection of information;

– participation in the QMS certification process (if necessary);

– maintaining effective functioning and management.

Main functions quality management department:

– implementation of quality policy;

– organization of work to improve quality;

– distribution of responsibility and authority, coordination of activities of all divisions of enterprises in accordance with the policy and strategic goals of management in the field of quality;

– together with other structures of the quality system of enterprises, conduct training, internal methodological advice to heads of structural divisions of enterprises in the development and implementation of quality management methods and QMS documentation;

– development of preventive and corrective measures;

– preparation of proposals for eliminating inconsistencies, improving the qualifications and motivation of personnel, improving the material base, management at enterprises;

– creation of regulatory documents that meet the requirements of GOST R ISO, regulating the activities of enterprises in the field of quality management;

– ensuring the conduct of internal and external audits of the quality management system at enterprises;

– participation in seminars, conferences on quality problems held in external organizations on the territory of the Russian Federation;

– organization and holding of seminars, conferences on quality problems at enterprises;

– interaction with educational institutions, state and non-state public organizations in the Russian Federation, whose activities are aimed at improving quality.

The staffing of the management department is shown in Table 29.

Table 29. Personnel composition of the quality management department

Position	Kind of activity	Education	Work experience
Quality manager	Monitoring the work of other employees of the department	Higher	From two years
Quality Analyst	Enterprise analysis	Higher	From one year
QMS development analyst	Development of QMS at enterprises	Higher	From two years
QMS implementation analyst	Implementation of QMS at enterprises	Higher	From one year

In the center for standardization, certification and quality management, you can create a marketing department to expand the range of commercial services provided.

Conclusion

– Together with other divisions of the enterprise and the management of the enterprise, the marketing department will help develop a strategy for the market activity of the enterprise:

– the goal of the marketing department will be to develop recommendations and coordinate activities for the formation and implementation of procurement, sales and service policies of enterprises;

– the functions of the marketing department will include the analysis of the internal and external environment of enterprises, competitor analysis, market segmentation and product positioning, pricing, assortment formation and formulation of requirements for product quality and customer service, product promotion, formation and maintenance of the company's image and brands;

– the sales divisions will provide the marketing manager with information on the nature and results of their operations. The marketing department will provide all divisions of the enterprise with the information necessary for their market orientation of their activities;

– by order of the heads of enterprises and product groups, the marketing department will carry out certain types of marketing activities;

– the marketing department and marketing managers of enterprises will actively interact with the advertising department (TsSSiUK) to form an advertising company;

– decisions influencing the market orientation of the enterprise will be made by all enterprises on the basis of recommendations and in agreement with the marketing department.

For the proper functioning of the marketing department, there should be the following staffing, shown in table 30.

The payback period of the center of the DCS and the management company depends on the costs spent on the creation of the center and the estimated income received from the provision of services by this center.

The costs of creating a center should be divided into capital and current. Capital includes: purchase of buildings and equipment. Current ones consist of salary payments, utility bills, etc.

Table 30. Personnel structure of the marketing department

Position	Kind of activity	Education	Work experience
Marketer (2 people)	Providing marketing services	Higher	From one year
Analyst (2 persons)	Collection of information, analysis	Higher	From one year
Internet Marketing Manager	Organizes communication with other enterprises,	Higher	From one year

The capital expenditures for the establishment of the center are shown in Table 31.

Table 31. Capital expenditures

Expenses	Amount (rubles)
1	2
Purchase of a building 600 m ^{2} (at the rate of 1 m ^{2} $\times$ 27000)	16,200,000
Office equipment: 34 computers for 30,000 rubles. 4 scanners for 2500 rubles.	1,020000 10000
4 printers for 4000 rubles. 1 fax 4 photocopiers 3500 rubles each 6 split systems 11000 each	16000 10000 14000 66000
Furniture: 37 tables for 4200 rubles. 70 chairs, 1500 rubles. 40 table lamps 40 shelves 15 wardrobes	 155400 105000 14000 21000 205000
Equipment for IL: Tearing machine Laboratory balance	 1,700,000 45000
ZhNZO-2 Thickness gauge Calipers	7000 3850 1380
Other	556000
Total:	20149630

Operating costs are shown in table 32.

Table 32. Running costs

Expenses	Amount (rubles)
1	2
Company registration	78000
Accreditation of the certification department and testing laboratory	170,000
QMS implementation	156000
Electricity payment	3000
Internet connection	25500
Internet	7000
Stationery	12000
Wage:	
General manager	45000
Secretary-assistant	15000
Head of the department of standardization	20,000
Standardization Engineer (2 persons)	34000
Specialist in normative and technical documentation	15000
Head of the Certification Department	21000
Certification experts (3 persons)	48000
Secretary	6000
Head of IL	17000
Laboratory assistant (3 people)	24000
Secretary	5500
Head of Quality Management Department	25000
Quality Engineer (2 persons)	35000
Analyst	16500
Marketer (2 people)	30,000
Analyst (2 persons)	28000
Internet Marketing Manager	19000
Quality manager	16000
Quality Analyst	16000
QMS development analyst	16500
QMS implementation analyst	16000
Accountant (2 people)	25000
Programmer	17800
Document expert	12000
Electrician	7800
Cleaning woman	9000
Handyman (3 persons)	17300
Total per month:	557400
Total per month + 26% for the uniform social tax	702324
Total per year:	8427888
Total:	88793888

Estimated sales volume:

taking into account the production of 60,653,000 pairs of men's shoes, 94,021,000 pairs of women's and 35,482,000 pairs of children's shoes per year by TOP, the introduction of new technologies, the use of new materials, a constant change of assortment and the issuance of a certificate of registration of a declaration of conformity for a period of 3 years, approximately, about 2,500 should be received annually applications for only certification tests, that is, sampling will amount to 7,500 pairs per year.

About 24 pairs of shoes will be tested per day.

The prices for testing are shown in table 33.

Table 33. Test rates

Test type	Number of tests per year	Cost (rubles)
Determination of mass	277	170
Determination of total and permanent deformation	277	693
Definition of flexibility	833	403
Determination of the fastening strength of the bottom parts	833	688
Determination of the fastening strength of the heel	556	738

Taking into account the fact that for carrying out certification tests for women's and men's shoes, only three indicators are required, and for children's four, on average, testing for men's and women's shoes will cost 1,829 rubles, and for children's 1954 rubles. On average, the volume of sales from certification tests will be about 1,558,182 rubles.

The scope of implementation of the certification department:

- acceptance of applications for certification: 277 × 7,000 = 1,939,000 rubles;
- registration of declarations: 556 × 5,500 = 3,058,000 rubles;
- paperwork: 833 × 1,500 = 1,249,500 rubles;
- miscellaneous: 154,000 rubles;
- total per year: 6,400,500 rubles.

The scope of implementation of the standardization department when servicing 12 enterprises:

- development of standards of organizations: 12 × 200,000 = 2,400,000 rubles.

The volume of implementation of the quality management department when servicing 12 enterprises:

- introduction of new control methods (the price will depend on the enterprise, on average 55,000 rubles): 12 × 55,000 = 660,000 rubles;
- development and implementation of QMS (the price will depend on the characteristics of the enterprise, on average 75,000): 12 × 75,000 = 900,000 rubles;
- QMS certification: 12 × 45,000 = 540,000 rubles;
- provision of marketing services: 1,345,000 rubles;
- miscellaneous: 875400 rubles.

On average, the annual sales volume will be:

1558182 + 6400500 + 2400000 + 660000 + 900000 + 540000 + 1345000 + 875400 =

= 14679082 rubles

Let's calculate the approximate annual income of the center:

14679082 - 8879388 = 5799694 rubles.

The payback period of the center will be approximately:

$$20149630 / 5799694 = 3.5 \text{ years}$$

The center will have an approximate payback period of 3.5 years.

In the future, the profit can be used to expand the center, increase salaries for employees, repair and purchase new equipment.

As a result of the creation of TORs in the regions of the Southern Federal District and the North Caucasus Federal District, it is planned to achieve an economic effect, which is characterized by a decrease in logistics costs, stimulates the creation of enterprises for the production of components within TORs, and creates conditions for import substitution. But it is not enough just to create a TOP in the regions of the Southern Federal District of the North Caucasus Federal District, it is necessary to ensure its sustainable development in a certain market segment and the potential for its expansion in the future. Why is it necessary to use a set of marketing techniques: branding, participation in industry exhibitions, the creation of various advertising options, assortment policy. That will increase the volume of sales of products through recognition, increase the prestige, image of enterprises producing domestic footwear, which can also be achieved by improving the quality of products, focusing on advanced standardization, controlling the production of footwear at every stage of production, subjecting the incoming materials and raw materials to strict control. The final result of the research performed was the development of recommendations for ensuring the quality of manufactured footwear at enterprises that are going to enter the territory of advanced socio - economic development, which is being created in the regions of the Southern Federal District and the North Caucasus Federal District, namely, a proposal to create a center for standardization, certification and quality management.

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