

## RESEARCH OF ANTHROPOMETRICAL PECULIARITIES OF POPULATION IN UKRAINE

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**Summary.** Results of research and anthropometrical peculiarities estimation of Ukrainian population (Lugansk region) for 2004-2009 are arisen and their essential differences in comparison with standard are shown.

**Key words:** labour safety, , workplace, anthropometrical peculiarities, standards.

### INTRODUCTION

A state policy in the sphere of a labour protection and new safety concepts and nonaccident rate productions on industrial activity objects provide first of all an objective estimation of dangers and allow to plan ways of effort to combat them. In this connection increasing value gets exploring and designing interrelations in system "person-machine-environment" that has created necessary preconditions for perfection of existing norms and requirements to the workplace organization, and has caused occurrence of new research problems.

Nowadays widespread opinion that the accidental majority (80 %) is caused by human mistakes or the behaviour contradicting safety precautions [Rusak 1989, International low 1997]. According to the benor of co-ordinated opinion often expressed by supervising employees that the reason of accidents is "imprudence" or "levity" [Dushkov 2002]. The victim in accident, on the contrary, gires as the reason "time trouble", "race", "cares" or "nervousness". These opinions are needed to oppose the fact that even at high degree of rationalization in actions for a labour protection it is impossible to do without requirements to safe workers behaviour which often are not carried out. The "unwillingness" and "inability" are difficult to distinguish among themselves; but both unwillingness inability can have the ergonomic reasons. Labour protection experts should include similar aspects in the menacing dangers analysis and working out actions for accident prevention. Nowadays workers point out the inconveniences which arise during equipment servicing, first of all ergonomic, discrepancy of their anthropometrical possibilities to design mechanisms data, display

means and the information conclusion, put in due time in standards with a view to normal service and management of the equipment.

### **RESEARCH OBJECT**

The implemented analysis indicates to problems which have arisen last years with a view to convenience of the various equipment service of machine-building branch, including machineal which assumes valuation necessity of anthropometrical conformity peculiarities of Ukrainian population to requirement standards which are realized in design features and characteristics applied in mechanical mechanisms engineering. Therefore it is represented expedient to investigate a question of anthropometrical indicators change character of Lugansk region population during the last years and to estimate an urgency of the arisen problem from the point of labour safety.

### **RESULTS OF EXPERIMENTAL RESEARCH**

As one of essential workplace organization bases of the operator it is necessary to consider the account of the anthropometrical data since the ergonomical work organization part provides acceptance in attention of the functional and geometrical sizes of a human body at equipment designing and workplaces planning at the enterprises of a machine-building complex. In particular, a problem of the ergonomical work organization is statistical data gathering about distinctions in the various people sizes, and also the data about size of people deviations as by the received results it is possible to consider position of a human body and it's its physical efforts arising thus in the course of work.

The sizes of a body fixed at their sample to a sexual sign, in any case show deviations which should have normal distribution [Dushkov 2002], and characterized by the task of average value with a disorder range. This average value is defined under the anthropometrical (physiological) data, for example, on the basis of a sex, age, race, the constitution, but also and on social aspects and population, i.e. also it is necessary to collect this data.

The anthropometrical indicators received at inspection of population are representative for existing anthropometrical specifications updating. Carrying out such researches necessary timely updating of the data at equipment designing and workplaces planning at the enterprises of a machine-building complex. Time dynamics exploration of anthropometrical peculiarities variability allows to reveal an individually-typological variability direction of population living in the big industrial cities. In Ukraine the comparative analysis of constitution features of population at the age of 20-25 was not conducted throughout enough long period of time (since 1975), though all over the world the dimensional typology is reconsidered every 15 years, because for this period as a result of acceleration process there is a person anthropometrical characteristics change.

For example, in Germany norm DIN 33402 "The body sizes of the person" [DIN 33402-2:2005-12] which has been let out by special committee on ergonomics rationing in 2005, carries the data to 90 % of total number surveyed, i.e. the disorder area is stretched from 5 % to 95 % measured at a great number of peoples values. According to the anthropometrical peculiarities the considered data doesn't contain the smallest (from 0 % to 5 %) and the biggest (from 95 % to 100 %) people.

In 2005-2009 chair "The Labour protection and Safety of Life Activity" employees of East Ukrainian National University named after Volodymyr Dal during carrying out a practical lessons with students had been investigated specified characteristics of 1150 women and 1300 men at the age of 20-25. By results of processing data it was possible to compare anthropometrical characteristics of modern population (tab. 1) with State Standard Specification (SSS) characteristics established on [SSS 12.2.049-80] (tab. 2) which is now the basic document used at planning, the industrial equipment designing and the operators workplaces in Ukraine, and standard DIN 33402 "The body sizes of the person" (tab. 3), operating in Germany.

Table 1. **Distribution (%) of Ukrainian population at the age of 20-25 in 2005-2009**

Size, cm	Degree/Percentage to the number investigated people					
	male			female		
	5%	50%	95%	5%	50%	95%
1. Standing height	164,7	179,8	180,3	154,8	165,9	166,6
2. Hands scope	158,8	181,2	182,4	150,3	168,3	169,9
3. Sitting height	79,5	92,6	93,8	75,4	87,4	89,9
4. Height of eyes at sitting	67,7	81,2	81,8	61,9	76,4	77,1
5. Shin length	41,2	49,3	49,9	37,1	43,9	44,7
6. Hand length	64,8	78,9	79,8	60,9	71,6	72,1
7. Weight, kg	72,4	72,8	73,6	56,9	60	55,8

Table 2. **Distribution of the population (%), existed in Ukraine [SSS 12.2.049-80]**

Size, cm	Degree/Percentage to the number investigated people					
	male			male		
	5%	50%	95%	5%	50%	95%
1. Standing height	161,4	172,3	183,2	150,8	159,5	168
2. Hands scope	165,4	178,9	192,5	152,6	163,2	173,8
3. Sitting height	85,9	90,5	95	81,1	85,6	90
4. Height of eyes at sitting	73,1	77,4	81,7	69	73,4	77,7
5. Shin length	41,5	45,4	49,4	38,4	41,4	44,5
6. Hand length	76,7	84,2	91,7	71,1	77,1	83,1
7. Weight, kg	-	-	-	-	-	-

During researching such anthropometrical peculiarities were considered: standing height, hands scope, shin length, sitting height, height of eyes at sitting, hand length, weight – as they are essential at workplace designing according to branch standards operating in Ukraine on typical figures measurements of population and so called intergovernmental standards, which were included in the System of Labour Safety Standards [SSS 12.2. 032-78, SSS 12.2. 033-78] and developed on the basis of measurements in 1975-1978.

Table 3. **Distribution of the population (%), existed in Germany [DIN 33402-2:2005-12]**

Size, cm	Degree/Percentage to the number investigated people					
	male			male		
	5%	50%	95%	5%	50%	95%
1. Standing height	168,5	179	191	156	166	176
2. Hands scope	-	-	-	-	-	-
3. Sitting height	87,5	93,5	98,5	83	88	93
4. Height of eyes at sitting	76	81	87	72	77	82
5. Shin length	44	46,5	50	40,5	43	46
6. Hand length	70	76	82,5	63,5	69,5	76
7. Weight, kg	59,5	72,5	95	49	60	78,5

The comparative analysis of anthropometrical characteristics of modern population and the characteristics established according to State Standard Specification (SSS) 12.2.049-80 and DIN 33402, has revealed the tendency of human body change, and on each of the examined features results have shown various deviations from established in standard documents. Also, on the face of the received results, it is possible to make a conclusion that the modern person is physiologically developed inharmoniously and there is an evidence deviations on separate anthropometrical peculiarities do not carry system character testifies. For example, deviations on the feature of "height" show the average of 5...7 cm of increase, on the feature of "hands scope" – 3...5 cm of increase whereas, hands "hand length" the deviation is revealed on 4...5 cm of reduction in comparison with operating SSS 12.2.049-80. This deviations show the real workers discomfort and weariness reason during the servicing and running the equipment which is designed under outdated standards and it's peculiarities don't according to human possibilities, but the workplace and the equipment should be designed so that the worker traumatize possibility was reduced to a minimum and the most comfortable attainability of the workers extremities operating elements and normal object visualization and organs management. That's why from the point of view of labour protection usage of outdated standard documents at equipment designing and the workplace organization can lead the workers damage.

## CONCLUSION

The executed researches of anthropometrical of the modern population at the age of 20-25 argumental confirm necessity of standards operating revision in Ukraine which established ergonomical requirements to workplace during sitting and standing work, that will allow at the equipment designing and the operator workplace organization to consider its modern anthropometrical peculiarities, there will be an opportunity to reduce worker traumatize risk at the expense of increasing work comfort level.

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## ИССЛЕДОВАНИЕ НЕОБХОДИМОСТИ УЧЕТА ИЗМЕНЕНИЯ АНТРОПОМЕТРИЧЕСКИХ ПАРАМЕТРОВ НАСЕЛЕНИЯ В ТРЕБОВАНИЯХ СТАНДАРТОВ ПО ОХРАНЕ ТРУДА

Касьянов Н.А., Андрианова А.А., Медяник В.А.

**Аннотация.** Приведены результаты исследования и оценки антропометрических параметров населения Украины (Луганский регион) за 2004-2008 гг. и показаны их существенные отличия по сравнению с нормативными.

**Ключевые слова:** безопасность, производственные процессы, рабочее место, охрана труда, антропометрические данные.