Секція 3
Проєктування взуття та галантерейних виробів

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MATHEMATICAL SOFTWARE FOR AUTOMATED GLOVES DESIGN

Purpose. Develop mathematical software for automated design of a wide range of gloves on the basic parameters of the hand

Key words: mathematical software, computer-aided design, parameters of the hand, gloves

Objectives. According to the main parameters of the hand to develop mathematical software for automated design of a wide range of gloves.

Methodology. The research is based on the basic principles of leather goods production, methods of mathematical modeling, analytical geometry, theory of algorithms and programming

Research results. The leather goods industry is one of the largest branches of light industry. The main task of the leather goods industry is to meet the needs of people in high quality leather goods and a wide range. Therefore, the task of automated design of gloves is relevant.

The details of the gloves in most cases have a complex shape of the outer contour, which cannot be described analytically. Therefore, in the future we will approximate the outer contours of these parts. To do this, use the piecewise linear approximation method.

The piecewise linear approximation method is universal, i.e. suitable for any shape of flat geometric objects, does not require much time with the manual method of approximation, is easily automated.

In addition, the information in the piecewise-linear method of approximation is compacted, i.e. possible elimination of extra points without loss of approximation accuracy. Therefore, the piecewise-linear method of approximation of the outer contour of the part is the most convenient and simple in the automated

and manual preparation of information, does not impose restrictions on the geometry of the parts.

We will dwell on this method of approximation, in which the outer contour of any part of the gloves is represented by an approximating polygon with a given accuracy.

To unambiguously display an approximating polygon, it is necessary to know the coordinates of the vertices of this polygon and the order of their traversal, ie it is necessary to have an array of pairs of numbers $\{X_i, Y_i\}$ (where $i = 1,2..n$, $X_1 = X_n$ and $Y_1 = Y_n$), which determines the coordinates the vertices of the polygon in the order of their bypass.

Using the manual design technique [1-3], a parametric model was developed for each glove part, if the parameters on which the shape of the outer contour of glove parts depends and the dependences of vertex coordinates on the outer contour of the part on these parameters are obtained.

Let these parameters be the parameters t_1, t_2… t_q. Parametric models determine the dependence of each vertex of each part on the parameters, namely:

$$\begin{cases} X_i^j = F_i^j(t_1, t_2 ... t_q) \\ Y_{i,j} = R_i^j(t_1, t_2 ... t_q) \end{cases}, \quad \text{де} \quad \begin{aligned} i &= 1,2.....n \\ j &= 1,2,.... p_i \end{aligned}.$$

These parameters will be the dimensional features of the hand [1-3]. When designing gloves to individual order, the following parameters will be: *DlVelP* - the length of the thumb; *DlVkP* - length of the index finger; *DlSerP* - length of the middle finger; *DlBezP* - the length of the ring finger; *DlMiz* - length of the little finger; *Rebras* - the distance from the beginning of the muscle tubercle to the desired length of the glove; *ShDol* - palm width; *ObhVelP* - thumb girth; *Ampon* - the distance from the base of the thumb to the base of the index finger; *DovBug* - the length of the muscle tubercle; *DovDol* - the length of the palm.

Conclusion. Developed mathematical software for automated design of gloves on the basic parameters of the hand, which will create a software product for. automated design of a wide range of gloves.

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