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SMOOTHING OF SECTIONS OF CONTOURS OF GLOVE PARTS USING PARAMETRIC B-SPLINE AND INTERPOLATION SPLINE

Purpose. *Develop software for smoothing contour sections of glove parts using parametric B-spline and interpolation spline.*

Keywords: *gloves, parametric spline, B-spline, interpolation spline, software*

Objectives. Develop algorithms and implement them in software for smoothing contour sections of glove parts using parametric B-spline and interpolation spline.

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

Research results. Details of gloves in most cases have a complex shape of the external contour, which cannot be described analytically. Therefore, in the future, we will approximate the external contours of these details. For this, we will use the piecewise linear approximation method.

The piecewise linear approximation method is universal, that is, it is suitable for any shape of flat geometric objects, does not require a lot of time when using the manual approximation method, and is easily automated.

We will focus 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. But with this method of approximation, not all areas on the outer contours of glove parts meet the design and technological requirements. Therefore, it is necessary to smooth out these sections of the contours. To do this, we will use the parametric B-spline and interpolation spline [1-4].

We will use the parametric B-spline when it is necessary to obtain a smooth section of the outer contour that will pass near the reference points of this section of the contour.

We will use the parametric interpolation spline when it is necessary to obtain a smooth section of the outer contour that will pass through the reference points of this section of the contour.

It should be noted that approximation using a parametric spline does not impose restrictions on the geometry of the details/

In a parametric spline, any point on the curve between two consecutive reference points Pi and Pi+1 has coordinates [4]:

$$x(t)=((Ai3t+Ai2)t+Ai1)t+Ai0$$
$$y(t)=((Bi3t+Bi2)t+Bi1)t+Bi0,$$

where t increases from 0 to 1.

In the proposed algorithm, we highlight the following steps:

- selection of a detail that requires smoothing of parts of its outer contour;

- identification of the area on the outer contour of the part that needs smoothing;

- selection of the type of spline with which smoothing will be performed (parametric B-spline or parametric interpolation spline);

- smoothing of the selected area on the outer contour of the part;

- construction of a new contour of the part, taking into account the parts of the external contour of the part that were smoothed.

The developed algorithms are implemented in software that has a friendly interface and does not require additional knowledge when working with it.

Conclusion. Algorithms have been developed that are implemented in the software for smoothing contour sections of glove parts using parametric B-spline and interpolation spline.

References

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