

## OPTIMIZATION OF ASSEMBLE UPPERS SYSTEMS USING CAD/CAM

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The paper presents the optimization of assembly uppers using CAD/CAM systems based on bibliographic study and analysis of existing manufacturing technologies in the enterprise shoe ISC „Cristina Mold-Rom Simpex” SRL, Chisinau city. The purpose of this paper is to improve existing technologies uppers assembly in the company implementing new ways of designing manufacturing technologies footwear with uppers of leather. The practical value is to: develop automated design of technological process of assembling uppers of leather; developing unified database assembly faces technological operations; expanding the base of information about the process of assembly. The need for rapid introduction of high design constantly pressuring all companies producing shoes. Be the first to bring a new style shelves is often the difference between success and failure in business. The case study was conducted at the footwear company EFC "Cristina Mold-Rom Simpex" LLC, with conventional technologies and modern technologies. They have been made 10 models of shoes, is found the following: between classical and modern technologies is a difference of 1 to 5.0 min; number of workers performing traditional sewing machines, ranging from 1 to 2 workers on the automatic sewing machine made to engage a worker. Active introduction CAD/CAM systems in light is an innovative technique that allows improving the manufacturing uppers enhancing the quality uppers; decreasing the number of workers involved.

Keywords: technology, uppers, CAD/CAM systems.

### INTRODUCTION

Technological preparation of production of footwear includes a complex set of operations that must be performed in the shortest time with minimum cost and high quality. One of the main characteristics of the production of footwear is a frequent change models, and the large number of factors influencing technology assembly uppers. The error in assembling uppers are often associated with lack of experience of the designer. With the rapid development of science and technology, new fundamental technologies are developed and implemented immediately. Decision making in the manufacturing process can not be achieved by increasing the number of technologies, but in the process due to the use of computer aided design innovations (Volocariu, 1999).

### OPTIMIZATION OF ASSEMBLE UPPERS SYSTEMS USING CAD/CAM

The different industries have been introduced and implemented computer-aided systems design processes. Design automation of technological processes take account of the nature and relationship factors that determine the final quality of the finished product, cost effective technologies, structural and parametric optimization of the technological process designed.

Automates processes is due primarily to the scientific development of technology also mathematical methods and technical means. Advances in technology development and automation of computer aided engineering can determine this direction as one of the most successful.

Introduction of automatic sewing machines flow raises organizational issues, technical and technological (Papaghiuc, 2003; Papaghiuc and Ionescu, 1999; Volocariu, 1999). When installing automatic sewing machines must ensure:

- larger surface location;
- easy access to carry out adjustments;
- connectable installations air or vacuum;
- climatic conditions.

The use of the possibilities of automatic machines is possible only through rational organization technologies. The ideal situation is when they make a single model, as time period. The existence of automatic sewing machines raises models and designers who need to consider the shape and size of the product being processed. To this end, we can apply the principles of constructive typing and unification models. The need for rapid introduction of high quality designs constantly pressuring all companies producing shoes. Be the first to bring a new style shelves is often the difference between success and failure in business. To be competitive on the domestic footwear company management EFC "Cristina Mold-Rom Simpex" LLC purchased **CES\_2000** program. Using software facilitates the assembly CES\_2000 upper assembly, reducing manufacturing errors. The advantages of this program are: high productivity, the possibility of drafting drawing step applied at the seam, compatibility with any version of Windows, minimal energy consumption. To use the is required automatic sewing machine **CEM 350** (fig. 1) (<http://www.embroid.ru>).



Figure 1. Automatic sewing machine CEM 350

Sewing operations on this machine consists of phases whose content is determined by the number and order of the calculation technology. Realization phase is successful during an operating cycle of the machine, but can overlap in time over some stages of the preceding or following.

#### **COMPARISON OF TECHNOLOGIES TO ASSEMBLE UPPERS**

For a good collection of comparative analysis of the patterns is present during the sewing thereof, the number of workers involved, the cost of a pair, both made from the automatic machine and simple sewing machines (fig. 2-11 and tab. 1).



Figure 2. The analyzed 1 (MA 1)



Figure 3. The analyzed 2 (MA 2)



Figure 4. The analyzed 3 (MA 3)



Figure 5. The analyzed 4 (MA 4)



Figure 6. The analyzed 5 (MA 5)



Figure 7. The analyzed 6 (MA 6)



Figure 8. The analyzed 7 (MA 7)



Figure 9. The analyzed 8 (MA 8)



Figure 10. The analyzed 9 (MA 9)



Figure 11. The analyzed 10 (MA 10)

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Table 1. Comparative analysis of the models studied

Symbol models	Number of parts	Sewing time, min/pair		Number of workers needed		The cost of a pair, lei	
		The automatic machine	Simple machine	The automatic machine	Simple machine	The automatic machine	Simple machine
MA 1	8	4	6,1	1	2	2	6
MA 2	20	11	16,8	1	3	2	15
MA 3	8	3,5	4,5	1	2	2	6
MA 4	14	6	7,2	1	2	2	7,6
MA 5	2	3	4	1	1	2	3,6
MA 6	2	2	3,6	1	1	2	3,6
MA 7	14	6	7,2	1	3	2	7,6
MA 8	16	6	8	1	3	2	9
MA 9	12	4,5	6,6	1	2	2	6,8
MA 10	14	5	6,6	1	3	2	7,6

Analyzing the results shows that for performing automatic stitching machine CEM 350 is required for sewing smaller than if the sewing machine simple. The offset is from 1 to 5,0 min / pair. Regarding the number of workers who perform sewing is a reduction to a minimum when using automatic machines, more than that depending on the organization of the manufacturing process and range made a working could serve 2-3 automatic. The cost of a pair of semi plain sewing the machine is much higher than the cost of semi automatic machine sewn. The price of the machine semi automatic sewing is set by chief engineer and is 2 lei / pair, considering the complexity of the pattern and volume of production conducted in a month.

### CONCLUSIONS

1. Analysing the possibilities it offered CES\_2000 overall drive system CEM 350, is found to be a system that does not require sophisticated computers and great effort from the user to very way work. The program allows drawing drawing any version of Windows.

2. The combination of new designs for the seams be obtained by a varied appearance, which leads to the development of the collection of shoes has a given season, a healthy competition improve the appearance and quality.

3. By the simultaneous phase and the operations landmarks in different positions to achieve a considerable increase in labor productivity.

4. Implementation of automatic sewing machine CEM 350 allowed increasing the precision and execution of stitches.

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