



ASPECTS REGARDING THE SETTING OF TIME STANDARDS FOR THE PRODUCTION AND SEWING OPERATIONS

SECAN Cristina¹, DORSONSZKY Laszlo²

¹ University of Oradea, Department of Engineering and Industrial Management in Textile and Leatherworks, Faculty of Energy Engineering and Industrial Management, B.St Delavrancea str., no 4, Oradea, Romania,
E-Mail: cris_secan@yahoo.com

² Sînmartin, Morii Str., no 9, Romania, E-Mail: dorlaci@yahoo.com

Corresponding author: Secan Cristina, E-mail: cris_secan@yahoo.com

Abstract: This paper presents the technological process of manufacture of a shoe for women in IL system in order to establish the time and the production norm in the processing-sewing procedure. The sequence of operations is presented in a case study that analyzed how can be obtained the upper assembly of a footwear product that later becomes integral part into the finished product. Drawing up the technological process is done considering both the manual operations and the manual-mechanical operations for processing and assembling the parts that make the whole upper assembly by gluing the parts, by seaming and securing the joints. The type of equipment chosen to carry out operations is influencing through its productivity the necessary material calculated and hence the labour force required. The amount of time consists of time needed for preparation-finishing time, operative time, time of working place service and time of regulated interruptions. These periods of times were determined basically by timing assistance of the manufacturing process throughout its development. Production norm is calculated on the basis of the standard time, taking into account that it represents the amount of products manufactured in a work shift In order to improve the process by reducing the time of production and the number of workers engaged we are considering the automation of the manufacturing process by using modern methods using laser cutting or cutting under running water, automatic sewing machines, strip conveyor belts with pace imposed etc.

Key words: footwear, cutting, technological process, production norm

1. INTRODUCTION

In order to manufacture footwear in a certain quantity, in the processing-sewing workshop, it is necessary that the product goes through all the stages of the technological process in a given time so that the norm of production will be achieved with the support of labour force, which should be correlated with the cost of manufacturing the product, in the organizational and technical conditions specified [1].

The amount of time is expressed according to the preparation-finishing time, operative time, time of working place service and time of regulated interruptions.

The production standard calculated based on the amount of time, will subsequently serve to establish the required labour force for all operations in the technological process [2].

The amount of time (**Nt**) - is the time allotted to a contractor to manufacture a product unit, considering the technical and organizational conditions established of the working place within the respective operation[3,4].

Nt is expressed in minutes person / pair of shoes and it is composed of:

$$Nt = T_{pi} + T_{op} + T_{dl} + T_{ir} \quad (1)$$

T_{pi} – time for preparation – finishing

T_{op} – operative time

$$T_{op} = t_b + t_a \quad (2)$$

T_{dl} – time for diversifying the working place

$$T_{dl} = t_{do} + t_{dt} \quad (3)$$

t_b – basic time
 t_a – assisting time
 t_{do} – time for organizational service
 t_{dt} – time for technical service

$$T_{ir} = t_{on} + t_{to} \quad (4)$$

t_{on} – time for rest and physical needs
 t_{to} – time for disruption conditioned by labour technology and organization

The production standard (**Np**) – represents the products quantity that can be manufactured in a time unit in the conditioned established.

The amount of time can be used as it is or to establish the production norms, knowing that between the amount of time and the norm of production there is the following relationship:

$$N_p = 1 / N_t, \text{ (per./ min. person)} \quad (5)$$

Where the determination N_p on the shift is necessary, we will use the relationship:

$$N_p = T_m / N_t, \text{ (per. / 8h person)} \quad (6)$$

T_m – duration of work shift = 480 minutes

In the amount of time, the sum of components T_{pi} , T_{dl} and T_{ir} , for the sewing operations, depends on the type of sewing machine used; this sum of time is expressed in relation to the T_{op} , applying a coefficient of different value, as follows:

$$T_{pi} + T_{dl} + T_{ir} = K \times T_{op}, \quad (7)$$

$K = 0,154$ (for flatbed sewing machines with a needle, for simple seams with 2 threads and zigzag)

$K = 0,170$ (for sewing machines with one column and 1 needle)

$K = 0,200$ (for flatbed sewing machines, with 2 needles and for sewing machines with one column and 2 needles)

Knowing the type of the sewing machine, we can calculate the amount of time N_T (minutes/pair of shoes).

$$N_t = T_{op} (1 + K) \quad (8)$$

To establish the production norm we will use the relationship:

$$N_p = T_m / N_t = 480 / N_t \text{ (pairs of shoes / 8 hours-person)} \quad (9)$$

2.CASE STUDY

To illustrate the organization method of processing-sewing in continuous flux, in order to establish the amount of time and norm of production, the technological process is shown of a woman's footwear in IL system, made of full grain leather combined with split leather



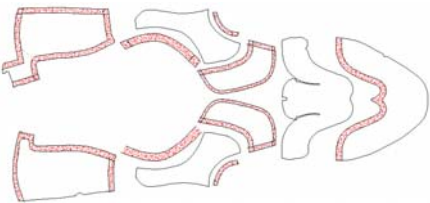

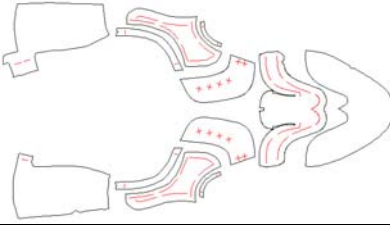


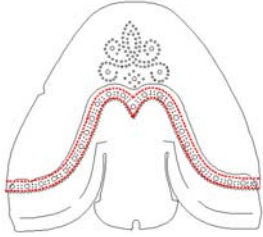
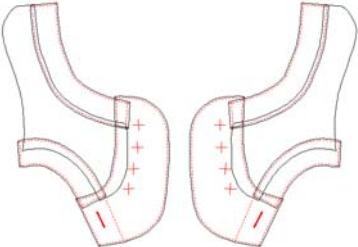
Fig. 1: Woman footwear

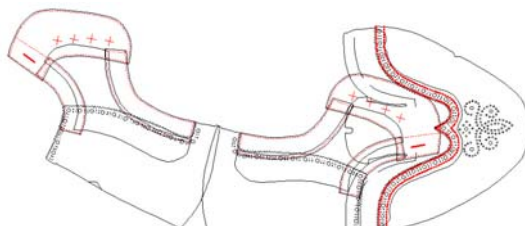
The way the product is formed from appropriate subassemblies and assemblies, covering the

manufacturing flow made up of operations that are carried out in sequence or parallel-sequential, as well as the condition changes that materials undergo during the process are shown below, choosing the type of machine with the help of which the product will be manufactured [5,6].

Table 1: The technological process

	Operation	Exterior subassembly of upper assembly
1.	Cutting upper parts: top bands, vamp, decorative top marker, tack seal and linings Execution mode of operation: mechanic Amount of time: 3,2 [min* person/pair] Production norm: 150 [per. / 8h person]	
2.	Levelling the upper parts and lining Execution mode of operation: mechanic Amount of time: 0,8 [min* person/pair] Production norm: 600 [per. / 8h person]	
3.	Thinning the edges of parts: skewed finite thinning, slightly skewed thinning and straight thinning Execution mode of operation: mechanic Amount of time: 1,5 [min* person/pair] Production norm: 320 [per. / 8h person]	
4.	Stamping the upper parts in the reserve Execution mode of operation: mechanic Amount of time: 10 [sec* person/pair] Production norm: 2880 [per. / 8h person]	
5.	Marking the parts Execution mode of operation: manual Amount of time: 20 [sec* person/pair] Production norm: 1440 [per. / 8h person]	
6.	Greasing for folding the edges of top band Execution mode of operation: manual Amount of time: 18 [sec* person/pair] Production norm: 1600 [per. / 8h person]	
7.	Folding the top bands edges Execution mode of operation: mechanic Amount of time: 1,2 [min* person/pair] Production norm: 400 [per. / 8h person]	
8.	Greasing and placing the decoration and top bands Execution mode of operation: manual Amount of time: 2,51 [min* person/pair] Production norm: 191,23 [per. / 8h person]	

9	Greasing and placing top vamp on vamp Execution mode of operation: manual Amount of time: 1,49 [min* person/pair] Production norm: 322,14 [per. / 8h person]	
10	Sewing top vamp on vamp Execution mode of operation: mechanic Amount of time: 1,35[min* person/pair] Production norm: 355,5 [per. / 8h person]	
11	Sewing top bands on the first row Execution mode of operation: mechanic Amount of time: 1,28[min* person/pair] Production norm: 375,00 [per. / 8h person]	
12	Greasing and placing tack seal on the top bands Execution mode of operation: manual Amount of time: 50 [sec* person/pair] Production norm: 576 [per. / 8h person]	
13	Greasing and placing the vamp Execution mode of operation: manual Amount of time: 30 [sec*person/pair] Production norm: 960 [per. / 8h person]	
14	Sewing around the lashing and stiffening the seam Execution mode of operation: mechanic Amount of time: 43,3[sec* person/pair] Production norm: 665,1 [per. / 8h person]	
15.	Sewing the tack seal on the top bands Execution mode of operation: mechanic Amount of time: 1,1[min* person/pair] Production norm: 436,36 [per. / 8h person]	
16.	Applying the laces and greasing for folding the edge of the tack seal Execution mode of operation: manual Amount of time: 3,20[min* person/pair] Production norm: 150 [per. / 8h person]	
17.	Bending the edge of the tack seal Execution mode of operation: mechanic Amount of time: 2,48[min* person/pair] Production norm: 193,54 [per. / 8h person]	
18	Greasing and placing top bands on the vamp Execution mode of operation: manual Amount of time: 1,47[min* person/pair] Production norm: 326,53 [per. / 8h person]	

19	Greasing and placing counter stiffener on the upper parts and applying gummed tape Execution mode of operation: manual Amount of time: 1,46[min^* person/pair] Production norm: 328,76 [per. / 8h person]	
20	Sewing counter stiffener on the upper parts and the stiffener at the back Execution mode of operation: mechanic Amount of time: 4,28[min^* person/pair] Production norm: 112,14 [per. / 8h person]	
21	Preparing the lining: greasing and placing Execution mode of operation: manual Amount of time: 17[sec^* person/pair] Production norm: 1694,1 [per. / 8h person]	
22	Finishing the lining of the counter stiffener Execution mode of operation: mechanic Amount of time: 18[sec^* person/pair] Production norm: 1600 [per. / 8h person]	
23	Levelling and placing band on the lining of the counter stiffener Execution mode of operation: manual Amount of time: 25[sec^* person/pair] Production norm: 1152 [per. / 8h person]	
24	Greasing the upper parts and linings and folding the braid Execution mode of operation: manual Amount of time: 1,1[min^* person/pair] Production norm: 436,36 [per. / 8h person]	
25	Lining the top bands Execution mode of operation: manual Amount of time: 1,20[min^* person/pair] Production norm: 400 [per. / 8h person]	
26	Sewing around the top bands Execution mode of operation: mechanic Amount of time: 2,43[min^* person/pair] Production norm: 197,53 [per. / 8h person]	
27	Cleaning the lining Execution mode of operation: mechanic Amount of time: 20[sec^* person/pair] Production norm: 1440 [per. / 8h person]	
28	Sewing the top bands and key Execution mode of operation: mechanic Amount of time: 3,20[min^* person/pair] Production norm: 150 [per. / 8h person]	
29	Greasing and gluing the lining of the top bands with the lining of the vamp Execution mode of operation: manual Amount of time: 47[sec^* person/pair] Production norm: 612,76 [per. / 8h person]	
30	Sewing the lining of the vamp with the	

	lining of the top bands Execution mode of operation: mechanic Amount of time: 2,20[min* person/pair] Production norm: 218,18 [per. / 8h person]	
31	Cleaning the lining of the top bands and lashing Execution mode of operation: mechanic Amount of time: 1,0[min* person/pair] Production norm: 480 [per. / 8h person]	
32	Perforating the top bands for the laces Execution mode of operation: mechanic Amount of time: 20[sec* person/pair] Production norm: 1440 [per. / 8h person]	
33.	Applying the top cap Execution mode of operation: mechanic Amount of time: 0,8[min* person/pair] Production norm: 600 [per. / 8h person]	
34.	Pulling the thread ends and cleaning the semi-manufactured product Execution mode of operation: manual Amount of time: 1,57[min* person/pair] Production norm: 305,73 [per. / 8h person]	
35.	Control, errands transport in the regrouping warehouse Execution mode of operation: manual Amount of time: 1,5[min* person/pair] Production norm: 320 [per. / 8h person]	

3. CONCLUSIONS

The amount of time has an important role in determining the number of manual jobs and manual-mechanical jobs and the number of workers needed who serve in order to achieve the products volume.

In determining the operative time, the sewing operations influence the seams route, their length, the radius of curvature, the time required for different handling required for joining by sewing. A special influence has the type of the sewing machine adopted with the help of which the amount of time is calculated.

With the amount of time we will then calculate the production norm and also the number of jobs for all operations in the technological process.

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