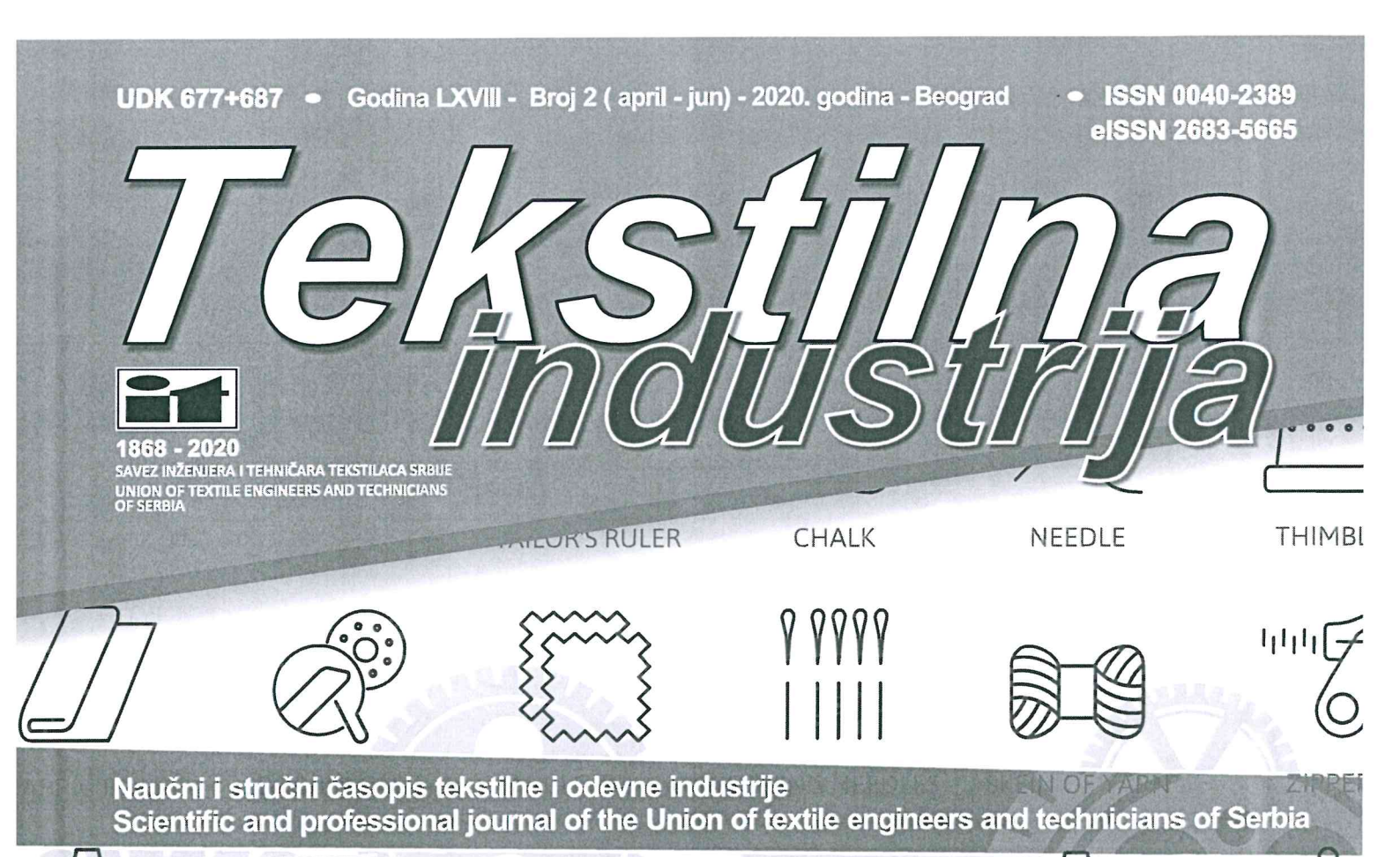
UDK 677+687 • Godina LXVIII - Broj 2 (april - jun) - 2020. godina - Beograd • ISSN 0040-2389
eISSN 2683-5665

Tekstilna industrija

1868 - 2020
SAVEZ INŽENJERA I TEHNIČARA TEKSTILACA SRBIJE
UNION OF TEXTILE ENGINEERS AND TECHNICIANS OF SERBIA



Naučni i stručni časopis tekstilne i odevne industrije
Scientific and professional journal of the Union of textile engineers and technicians of Serbia

Najbolja publikacija za 2018. godinu

DEFECTS DETECTION IN THE FIRST MANUFACTURED MODULE - ENSURING ERRORS FLOW IN THE GARMENT MANUFACTURING PROCESS

Sanja Risteski*, Vineta Srebrenkoska, Stefan Maksimov

University "Goce Delčev", Shtip, Faculty of Technology,
Norh Macedonia
*e-mail: sanja.risteski@ugd.edu.mk

Professional paper
UDC: 687+658.5.005.4
doi: 10.5937/tekstind2002018R

Abstract: *Quality control is necessary quality management activity. It doesn't create values but it contributes to more successful work in the company. It ensures that the tasks set out in the plan are accomplished in a timely, rational and cost-effective manner. In this paper an approach to assessing the quality of the first manufactured module in the production of clothes is made. Defects that reduce the use value of clothes, and their frequency caused because of a poor quality were detected. With use of Ishikawa diagram, the causes for defects occurrence were identified, and their elimination was initiated.*

Key words: quality, costs, errors, control.

ODREĐIVANJE DEFEKTA U PRVOM PROIZVODNOM MODULU – OBEZBEDITI SE OD POJAVE OŠTEĆENJA U PROCESU PROIZVODNJE ODEĆE

Apstrakt: *Kontrola kvaliteta je neophodna aktivnost upravljanja kvalitetom. To ne stvara vrednosti, već doprinosi uspešnom radu u kompaniji. Kontrola kvaliteta omogućava da se zadaci u radnom planu izvršavaju na vreme, racionalno i ekonomično. U ovom radu je dat pristup proceni kvaliteta prvog proizvedenog modula u proizvodnji odeće. Otkriveni su nedostaci koji smanjuju upotrebnu vrednost odeće i njihovu učestalost uzrokovanu lošim kvalitetom. Upotrebom Ishikava dijagrama identifikovani su uzroci pojave grešaka i njihovo otklanjanje.*

Ključne reči: kvalitet, troškovi, greške, kontrola.

1. INTRODUCTION

In the past, quality was considered as a task of the final control, which means that at the end of the production process the controllers separate the defective products from the quality ones. However, over the time this system proved to be slow and expensive, because controlling the products only at the end of the production process can result with a higher number of defective products, and that can lead to a quality products obtaining, but at higher price. The next stage in the control development is focused to prevent defects occurrence, which imposes control at all stages of the technological process. With this approach, any omissions related to machines, man, raw materials can be detected and actions for solving can be made. Contemporary control is focused on a defects prevention [1,2,3].

Because the quality of a product is created during the production process, it is necessary:

- ✓ To form a complex of business processes, starting from the entry of raw materials to a finished product;
- ✓ To select methods for examining the working process;
- ✓ To select methods and instruments for the working process;
- ✓ Determine the control, depending of the working process, in other words to find the quality indicators – what should to be controlled;
- ✓ The standardization of the meaning of those indicators, the category of defects, etc;
- ✓ To determine the liabilities of the control, that are terms of the operators and controllers;
- ✓ To implement verification method and methods for verifying regulations and measuring instruments. To indicate those places that are subject to statistical regulation by applying control cards as well as the type of control card;
- ✓ To determine the methods and measures for action if deviations occur;
- ✓ Prepare a control card for the quality of business processes in which all technological operations are given, each stage of production and the quality of work in it is considered, but taking care to choose the appropriate instrument to achieve proper control [4, 5, 6].

In this paper is made an approach to assess the quality of the first production module, in the clothes production. Detecting certain defects, which reduced the use value of clothing, and have serious impact in the overall costs caused due to a poor quality, was also made. With the use of Ishikawa diagram, the causes of defects occurrence were determined, and their elimination was approached [7,8,9].

2. EXPERIMENTAL

The model of women skirt that is subject to this analysis is shown below (Fig. 1).

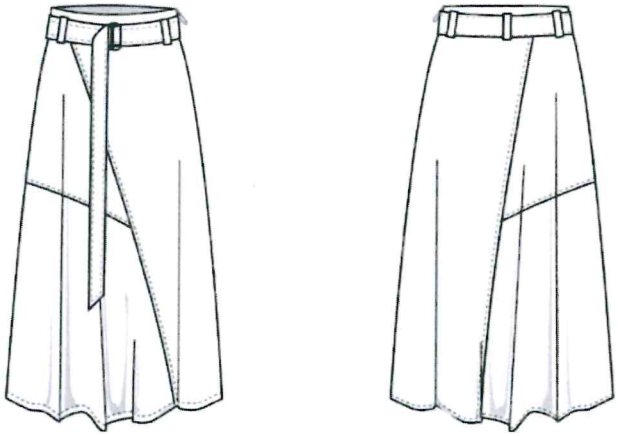


Figure 1: Front and rear part of the women skirt

In the process of the model production, was made an approach to quality control of the first manufactured module. According to the company's standard operating procedures, when a new model gets in the production line, accessed to the so-called production of the first module, which always amounts to 1.5% of the total order, which means one level below the specified level of acceptable quality (AQL) in the company, which is 2.5%. During the production of this first module, the technologist together with the line controllers have the task to detect possible defects in the performance of each technological operation. Based on the received information, the production technologist is obligated to analyze and eliminate the possible causes for the occurrence of the registered defects.

Table 1 shows the work order, which defines the number of ordered pieces, the number of pieces from the first manufactured module as well as other informations that are an integral part of the work order.

Table 2 shows the plan of technological operations for the preparation of the model of women skirt.

Table 1: Work order of the women skirt

Size	32	34	36	38	40	42	44	Total
Pre-production example	/	1	3	1	/	/	/	**5**
Pre-order 99869	17	153	258	237	201	152	54	**1072**
First production module	/	2	4	4	3	2	1	**16**

Table 2: Plan of technological operations for the preparation of the model

Number of operation	Type of operation	Type of stitch	Time of manufacture
Fixing			
1.1	Fixing loops	/	0,25
1.2	Fixing belt	/	0,25
1.3	Fixing movable belt	/	0,25
1.4	Fixing seam under the zipper	/	0,25
Loops			
2.1	Making loops	301	0,55
2.2	Interphase ironing of the seam x5	/	0,35
2.3	Turning loops x5	/	0,90
2.4	Ironing loops	/	0,30
2.5	Cutting loops	/	0,45
Movable belt			
3.1	Movable belt making	301	1,95
3.2	Cutting the reserve of the belt on the corners and turning	/	0,98
3.3	Ironing belt	/	0,90
3.4	Making decorative stitch (0,5 cm around)	301	1,80
3.5	Sewing belt buckle for belt to toil through	301	1,22
Belt			
4.1	Sewing brand label	301	1,12
4.2	Ironing belt (1,0 cm and then on half)	/	0,85
Front part			
5.1	Sewing upper and bottom right part	301. 504	0,48
5.2	Making decorative stitch (0,5 cm around)	301	0,40
5.3	Sewing upper and bottom front part	301. 504	0,69
5.4	Making decorative stitch (0,5 cm around)	301	0,58
5.5	Overlock the side seams	504	0,67
5.6	Sewing loops on the marked position	301	0,54
Rear part			
6.1	Sewing upper and bottom right part	301. 504	0,48
6.2	Making decorative stitch (0,5 cm around)	301	0,40
6.3	Sewing upper and bottom rear part	301. 504	0,69
6.4	Making decorative stitch (0,5 cm around)	301	0,58
6.5	Overlock the side seams	504	0,67
6.6	Sewing loops on the marked position	301	0,54
Montage			
7.1	Sewing side seams	301	1,65
7.2	Ironing the seams	301	0,95
7.3	Sewing belt	301	2,43
7.4	Sewing zipper	301	2,95
7.5	Closing the zipper	301	3,97
7.6	Sewing label (sustenance)	301	0,25
7.7	Sewing label (size)	301	0,25
7.8	Sewing loops (1,0 cm from the upper side of the belt)	301	1,65
7.9	Overlock the hem	504	1,03
7.10	Single tuck and iron the hem	/	1,20
7.11	Stitching the skirt	301	1,12
Finishing operations1,20			
8.1	Cleaning the extra thread	/	1,20
8.2	Control of finished garment	/	1,95

3. RESULTS AND DISCUSSION

The obtained results from the control during the production of the first module are shown in Table 3.

Table 3: Check list of observed defects and their amount in the total number of defects

Serial number	Type of defects	Number of defects	Detected defects from the total number of defects (%)	Cumulative Percentage (%)
1	Irregularly sewn (attached) loop	1	5	5
2	Irregular width of the hem	1	5	10
3	Holes on the side seam	15	75	85
4	Crease on the zipper seam	1	5	90
5	Glaze on seams (movable belt) from ironing	2	10	100
Total		**20**		

From the obtained results (shown in Table 3) can be noticed that the largest percentage of registered defects in the first manufactured module, as much as 75% belong to the defect - holes on the side seam, which occurs at the preparation of the technological operation under serial number 7.1.

The number of defects in the technological operation 3.3 (belt ironing) is also high and it occurs immediately after finishing the technological operation 3.3. Other defects that occur with insignificant proportions are as follows: Irregularly sewn (attached) loop (technological operation 7.8), Irregular width of the hem (technological operation 7.11) and crease on the zipper seam (technological operation 7.4).

impact on the process of production of women's skirt, and are possible causes of the defects that have the largest role.

One of the possible factors (for the occurrence of the defect holes on the side seam) is the machine, respectively adjustment and needle (Figure 3). For the preparation of the technological operation 7.1 (sewing side seams) was made the wrong choice of needle size as well as the wrong choice of transport gears during machine setup. The defect is shown on Figure 2.

To test whether the wrong choice of needle size and the wrong choice of transport gears are the main causes for the defect (holes in the side seam), new samples were sewn. It was selected a type of needle

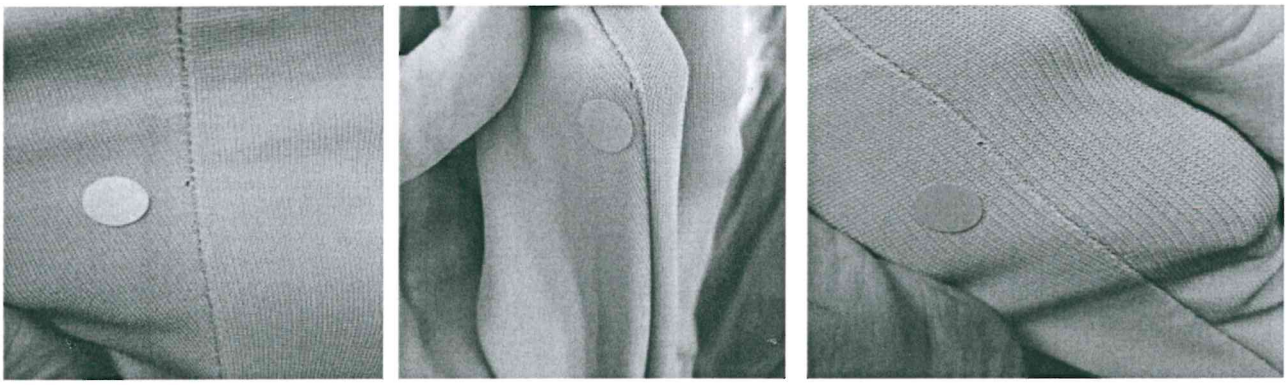


Figure 2: Holes on side seam defect

The defect holes on the side seam occur in almost all manufactured pieces of the first module intended for testing. This is warning for an unstable flow of production and production of low-quality products. In order to eliminate this defect, the most important thing is to detect the causes that lead to his occurring, as well as finding an appropriate solution. For that purpose, the Ishikawa diagram (Figure 3) has been applied, which presents all the factors that have an

with a medium sphere head and needle with numeration Nm 65./9 , instead of the previously used needle with numeration Nm 75/11 with normal conic head. The transport gears with higher density and lower inclination were also applied (Figure 4). The pattern of the seam sewn with a new machine settings is shown on Figure 5.

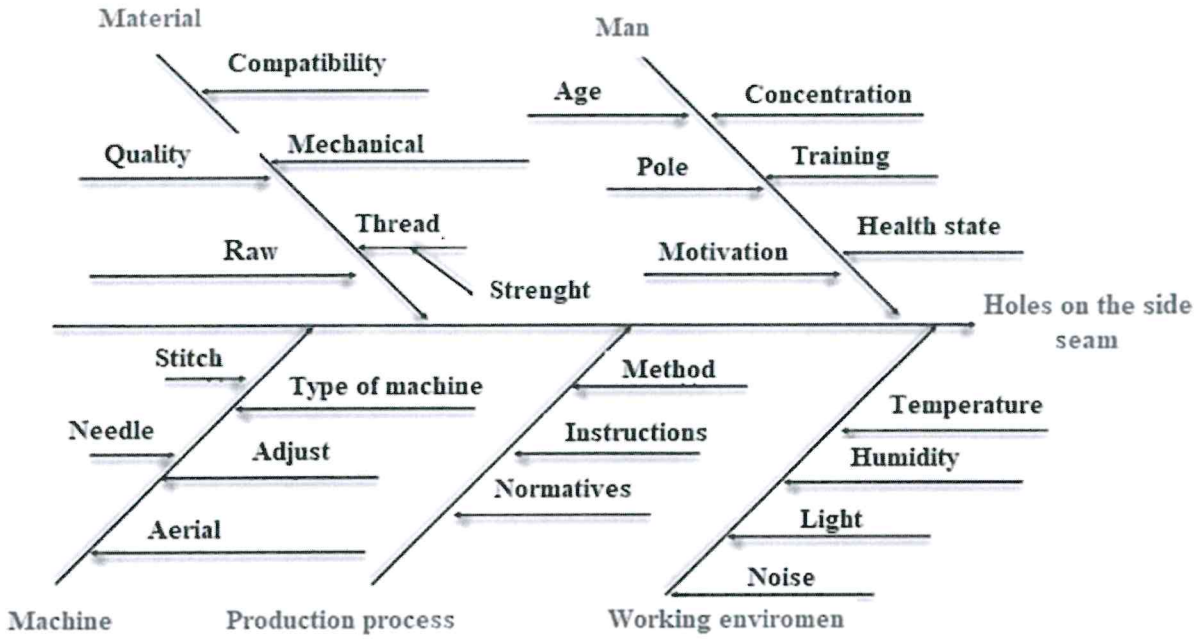
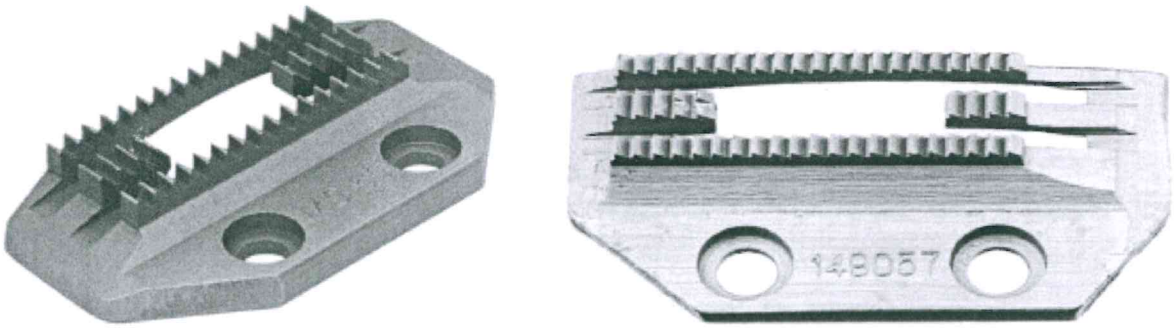


Figure 3: Ishikawa diagram for the operation holes on the side seam



a) b)

Figure 4: Transport gears

a) producing defects on the sample b) producing no defects

For the other defects occurring, it was noticed that the main cause is the man. That indicates that the line controllers should pay more attention in controlling operators who are working on these operations, to achieve a stable and quality course of the production process without variations for defects repair.

In addition, Table 4 shows the registered defects in the final production control. With the application of inter-phase control and control in the first manufacture module, the detected defective products did not exceed 2% of the total produced pieces of women's skirt. This indicates a steady flow of production process, without additional operating losses due to poor quality, caused by machines, materials and man.

Figure 5: Sample sewn according to the new machine settings

Table 4: Check list of registered defects in the final control

Type of defect	Total frequency	Defects occurrence in the total number of manufactured pieces (%)
Missing label (operation 7.6)	2	0,19
Missing label (operation 7.7)	3	0,28
Badly ironed seams (operation 7.2)	2	0,19
Uneven width of the hem (operation 7.10)	5	0,37
Glaze from ironing	4	1,49
Total	**16**	**1,49**

4. CONCLUSION

From the obtained results can be concluded that the inter-phase control can contribute to improve the course of the production process, in the meaning to provide a stable and no defective flow.

According to the results in the first manufactured module several defects were detected, which reduced the value of the product, and represented potential complaint by customers.

The largest percentage of registered defects in the first manufactured module, as much as 75% belong to the defect holes on the side seam, which occurs at the preparation of the technological operation under serial number 7.1.

Applying the Ishikawa diagram were detected the reasons (factors) for this defect occurring. According to the results from the Ishikawa diagram it was concluded that one of the possible factors that have impact of the defects occurring was the machine, respectively adjustment and needle. That means that was made the wrong choice of needle size as well as the wrong choice of transport gears during machine setup.

To test whether the wrong choice of needle size and the wrong choice of transport gears are the main causes for the defect (holes in the side seam), new samples were sewn.

The type of needle was changed- the previously used needle numeration Nm 75/11 with normal conic head was replaced for a needle with a medium sphere head and numeration Nm 65/9.

The transport gears with higher density and lower inclination were also applied, so the number of defects was reduced.

For the other defects occurring, it was noticed that the main cause is the man, which indicates that the line controllers should pay more attention in controlling operators who are working on these operations, to achieve a stable and quality course of the production process without variations for defects repair.

With the application of inter-phase control the number of defects began to decline, and this reflects in the final control results, indicating a stable process, with 1.49% defective products. This means that the goal has been achieved, the quality is satisfactory, and operating losses due to poor quality were minimized.

REFERENCES

[1] Krishna, B. Misra. (2008). *Quality Engineering and Management* (Handbook of Performability Engineering. Springer Verlag, London. 157-170.

[2] Juran, JM., Gryna Jr. FM. (1980). *Quality planning and analysis*. 2nd edition, McGraw-Hill, New York.

[3] Чепујноски, Ѓ. Чепујноска, В. (1993). *Управување со квалитетот во практиката*. Скопје.

[4] Hakes C. (1991).*Total quality management: A key to business improvement*. Chapman & Hall, London.

[5] Cottman. Ronald, J. (1993). *Total engineering quality management*. Marcel Dekker. New York.

[6] Wood, M. (2002). *Understanding, Managing and implementing Quality*. Routledge, London. 103-119.

[7] Sorak S., Urošević S., Sorak M. (2017). Uticaj ponašanja rukovodilaca-menadžera na uspešnost poslovanja preduzeća tekstilne industrije u Banjoj Luci. *Tekstilna industrija*, 65(2), 40-47.

[8] Ќортошева, С. (2002). Анализа на трудот во конфекциско претпријатие. интерна скрипта, ТМФ-Скопје.

[9] Mehta P. V., Bhardwaj S. K. (1998). Managing quality in the apparel industry, Nacional institute of fashion technology, 235- 243.

Rad primljen: 01.05.2020.
Rad prihvaćen: 01.06.2020.

POSTAVLJANJE RADNIH MESTA U KROJAČNICI PRI AUTOMATIZOVANOM KROJENJU

Ineta Nemeša

Tehnički fakultet "Mihajlo Pupin", Zrenjanin
Univerzitet u Novom Sadu
e-mail: inetavil@gmail.com

Stručni rad
UDC: 687.1+681.5
doi: 10.5937/tekstind2002024N

Apstrakt: *Pravilno postavljanje radnih mesta je jedan od faktora koji obezbeđuje maksimalnu efikasnost procesa polaganja i krojenja tekstilnih materijala. Automatizovani procesi polaganja i krojenja imaju različitu produktivnost. Pri izradi narudžbina srednjih i velikih obima dve ili više mašina za polaganje moraju da pripremaju krojne naslage za jedan kater. Pri izradi malih narudžbina mašina za polaganje postavlja krojne naslage brže nego što kater može da ih iskroji. Stolovi/površine za odlaganje gotovih naslaga materijala različite dužine mogu biti postavljeni između stola na kojem radi mašina za polaganje i katera. Kratko vremensko skladištenje rolni direktno ispred mašine za polaganja može da ostvari uz pomoć karusel sistema. Pomoćni uređaji se koriste za postavljanje i skidanje rolna sa mašine za polaganje.*

Ključne reči: automatizovano polaganje, automartizovano krojenje, mašina za polaganje, automatizovani sistem za krojenje, stolovi za odlaganje, uređaji za postavljanje rolne.

PLACEMENT OF WORKSTATIONS FOR AUTOMATED CUTTING PROCESS

Abstract: *The correct placement of workstations is necessary for maximum efficiency of the work process in the cutting room. Automated spreading and cutting have different productivity. Working with medium and large orders two or more spreading machines have to prepare fabrics spreads for one automated cutter. Having small orders a spreading machine lays fabric quicker than a cutter can cut it out. In this situation special tables/surfaces are used to store ready spreads while the cutter is busy. Different movable and static frames/shelves and carousel systems are used to store fabric rolls short time directly next to the spreading machines. Fabric loaders are used to load and unload fabric rolls from a spreading machine.*

Keywords: automated spreading, automated cutting, spreading machine, cutting system, carousel system, transfer table, fabric roll loader.

1. UVOD

Pravilno postavljanje radnih mesta je jedan od faktora koji obezbeđuje maksimalnu efikasnost procesa polaganja i krojenja tekstilnih materijala. U krojačnici moraju da budu obezbeđeni sledeći uslovi:

- minimalno premeštanje/kretanje rolna sa tekstilnim materijalima i svežnjeva već iskrojenih delova da bi smanjilo fizičko opterećenje radnika [1,2],
- minimalno premeštanje i deformisanje krojnih nastaga da bi se sprečilo pomeranje slojeva materijala unutar gotovih krojnih naslaga,
- sinhronizovan radni proces za sve radne operacije u krojnici.