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THE SOURCES OF DANGERS AND THE CHARACTER OF INJURIES AT WORK IN THE GARMENT INDUSTRY

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Cvetko Z. Trajković, Dragan M. Djordjević

Faculty of Technology, Leskovac, Bulevar oslobodjenja 124, 16000 Leskovac Yugoslavia

Abstract. The garment industry is a specific branch because more than 70 % of time is spent on dealing with work objects. It demands great concentration of workers because, while doing basic movements with arm, hand, fingers, eyes, body, leg, foot, a lot of injury causing mistakes can be made. Since the level and results of protection at work have been experimented, especially concerning the level of injuries at work, the most frequent characteristics of technological processes in the garment industry are described in this essay with a special review the sources of dangers. Five years long observing of injuries at work in the garment industry "Inkol" in Leskovac has revealed some very interesting data about kinds and number of injuries. It's established that the number of injured workers ranges from 2.5 % to 4.8 % related to the average number of the employed and most frequent injuries are caused by machine pinpricks. Approximately 202 working days have been lost a year because of these injuries.

Key words: injuries, garment industry, protection.

INTRODUCTION

These last years the garment industry has been developed technically and technologically. This development is in the accordance with the development of science, technology and technique but the greatest contribution to this has been given by the development of electronics, computer science and mechanical engineering. Increasingly technological operations for marking cloths are performed nowadays with applying electronic leading systems.

The application of microprocessors makes possible the following: connecting different producing systems in the garment industry, numerical running of working machine organs for making clothes, application of industrial robots etc. Although the application of

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C.Z. TRAJKOVIĆ, D.M. ĐORĐEVIĆ

modern working instruments in the garment industry has transferred a physical working burden from the man to machine, it is evident for the industry that still more than 70% of working hours have been spent on operating with the objects of work [1]. This is especially expressed in technological sewing processes where joining pieces of dressing products, positioning, straightening, bringing and setting things on a sewing machine are still done mostly by hand. This demands a great concentration of workers when making basic movements with a hand, arm, fingers, eyes, body, leg and foot.

According to the statistics, the most frequent sources of workers' injuries in the garment industry are: insecure way of work, violation of the safe work regulations, keeping working places untidy, bad work organisation, machines with some defects, tiredness caused by monotonous work and insufficiency or lack of personal or collective protective means [2]. Since the level and results of protection at work are mainly evident through the range of work injuries, this study brings up the results of injury studies at workers in the garment industry "Inkol" in Leskovac.

The sources of dangers and protective measures at work in cutting rooms

Various working means slouch as regular and very complex in the combination with microprocessors, computers and robots are used in cutting rooms. Regardless the level of process automatisation, direct work on textile material, for the sake of changing its form, it is done with special tools, in other words, with means.

In the preparatory cutting phases, the machines for making piles are specific. The primary characteristic of these machines is that they consisted of mobile and immobile parts that can cause getting a hand, leg, and other body parts squeezed as well as strikes if not supplied with protective devices. More modern machines for piling have built-in devices in form of pressing levers settled on the closest to the man mobile parts and that way they come first in contact with, for example, a human body if it comes in their way and automatically stop the machine avoiding injuries. It's well known that injuries rarely happen on those machines.

The most important process in this phase of marking cloths is cutting of textile material. Cutting is performed under the affect of physical and in some cess chemical affects. For cutting of textile materials, the following energy forms are used: mechanical, electrical, chemical, and thermal [3].

The usage of different energies, various machines, devices and instruments, makes human work more productive, rational and releases the man of needless efforts, it also contributes to the humanization of work. However, on the other hand, it causes the appearance of different gases, dusts, in some quantities that can in some cases, change the normal air content. Besides, these machines are the sauces of mechanical injuries, noise, vibration, different radiations etc.

While above mentioned factors have influences on the man through an intermediary, air, for example, the other group of factors has its influence in direct contact or over approaching, for example, mobile machine parts, electricity, overheated steam etc. The difference between two groups of factors is that the first affects temporarily, while the second groups of factors' affect manifests postponed. Thus, for example, the affect of electricity, squeezes of body parts with mobile machine parts etc. are temporary, while noise, dust and various radiations exert their influence gradually causing professional

diseases.

In our garment cutting rooms, the most frequent way of cutting is mechanical. Depending on the character of cutting all mechanical ways of cutting can be divided into four groups:

- simple cutting,
- complex cutting,
- cutting in pair,
- combined cutting.

Simple cutting is when materials are cut with a cutting element that has one sharp edge suitable working speed. Cutting with shaped knives for punching machines belongs to this group. Depending on the number of piles that are punched, constructive characteristics of textile materials, size of shaped knives and its sharpness, smaller or bigger hydraulic or pneumatic pressures are applied. When working wrongly or carelessly, injuries such as cuts, squeezes, strikes etc. can appear. Something similar as to the machine for punched in the metal industry. When cutting elements make complex movements consisted of working and additional movements normally on the surface of cut materials, it is a complex cutting. As cutting instruments the following things can be used: a knife, indented knife, band knife and fluid steam.

The way of mechanical cutting when a material is cut from the both sides at the same time is called cutting in pair. For cutting with such cutting means, manual and mechanical scissors of different types are used, but workers can still be injured (a cut or squeeze as the result of big resistance that materials make while being cut).

Combined cutting presents the combination of two previously mentioned ways of cutting. Thus, for example, a principle of sewing + cutting with scissors is possible with the application of a mobile knife with the circling blade. The protection of hands from injuries is provided with the lever touching the upper material surface that is cut and thus a direct contact of the circling blade with workers' hands is prevented.

The coerces of dangers and protective measures at work in sewing rooms

These recent years, the production of sewing machines and devices has been considerably developed. Studies on new machine types and their single mechanisms have been developed. Applying these new knowledge's for the sake of achieving higher speeds in sewing and possibilities of introducing electronic computers, the five most important factors are achieved:

- increased productivity,
- savings in manpower,
- expense reductions in workers' training,
- improvement in quality production,
- safer and more humane work.

Sewing is a process consisted of series of pin-pricks meant for making a suitable seam with a purpose of connecting two or more material (parts) decorating or both. Since every machine has its mobile and immobile parts, many injuries can happen among which the most characteristic are:

- a machine pin-prick,
- a manual pin-prick,

- a stab with scissors for cutting threads,

- squeezes between immobile and mobile machine parts etc.

When sewing parts of dressing products there are, most frequently, injuries of fingers and hands. In most cases, these injuries happen because of incorrect movements performed by a worker during a technological procedure. Thus, for example, if a worker clumsily put the pedal down and not previously removing his hand that is under the pedal, some injury or squeeze can happen. What the intensity of the injury will be depends on the quantity of pedal pressure on the textile material and regulation of its height. Depending on the applied means of inner transports (movable stands, circling transport lines, hanging-on transporters etc.) injuries caused by strikes with these means can happen.

The sources of dangers and protective measures at work in finishing rooms

In finishing rooms for dressing products, the most important are wet-terminal operations, in fact, ironing of dressing objects. Although modern ironing presses have mostly built-in devices for protection against injuries, placed on the exposed edging parts of mobile press tablet, still, even in these phases of dressing production, injuries happen. The most often injuries at work in these phases of dressing production are cased by:

- strikes of a mobile press tablet,
- burns caused by industrial steam, slips on wet floors,
- strikes against the immobile press parts,
- strikes of mobile parts of hanging-on transporters.

Injuries are mostly light, in some cases, heavy injuries are also possible.

RESULTS AND DISCUSSION

The injuries at work in the garment industry "Inkol" in Leskovac happened in the period from 1985 to 1989 were observed. It means, in these years when "Inkol" worked with its full capacity and when it employed the greatest number of workers. Based on the records from that period, the analysis of the injuries at work has been made. (Table 1 and Fig. 1).

	The number of injuries through years										
Days of injuries		1985		1986		1987		1988		1989	
-	n	%	n	%	n	%	n	%	n	%	
Monday	4	28.6	2	9.5	6	37.5	5	31.2	8	32.0	
Tuesday	2	14.3	4	19.0	3	18.6	5	31.2	4	16.0	
Wednesday	2	14.3	8	38.2	1	6.3	2	12.6	6	24.0	
Thursday	5	35.7	7	33.3	3	18.7	-	-	5	20.0	
Friday	1	7.1	-	-	1	6.3	4	25.0	2	8.0	
Saturday	-	-	-	-	1	6.3	-	-	-	-	
Sunday	-	-	-	-	1	6.3	-	-	-	-	
Total	14	100.0	21	100.0	16	100.0	16	100.0	25	100.0	
The average number of the employed	405		439		454		612		992		
The number of the injured workers		3.46		4.78		3.52		2.61		2.52	

Table 1. The number of injuries through the weekdays

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The results given above in Table 1 show that the number of the injured workers at work ranges from 2,5 % to 4,8 % related to the average number of the employed a year. It is also evident that since 1987, there have been fewer injuries related to the total number of the employed. It is an interesting detail that injuries happened in the first and last weekdays, on Mondays, Thursdays and Fridays.



Fig. 1. The hystogram the numbers of injured workers at years

It we take in consideration the sources of injuries, in other words, the kind, the second analysis for the same period is made and the results are given in Table 2.

	Inium	(niury Y e a r									
The injury source	lingury —	1985		1986		1987		1988		1989	
	Kina –	n	%	n	%	n	%	n	%	n	%
Slips on the ice	light	4	28.7	-	-	1	6.2	-	-	2	8.0
Stabs with scissors	light	1	7.1	-	-	-	-	-	-	-	-
Machine pin-pricks	light	4	28.7	5	23.8	8	50.0	2	12.5	11	44.0
Manual pin-pricks	light	1	7.2	-	-	-	-	-	-	-	-
Cuts made with scissors	light	-	-	-	-	-	-	3	18.8	-	-
Cuts made with a banded knife	light	2	14.2	3	14.2	1	6.3	3	18.8	5	20.0
Cuts with a vertical knife	light	-	-	1	4.8	-	-	1	6.3	2	8.0
Cuts made with an ordinary knife	light	-	-	-	-	1	6.3	1	6.2	-	-
Cuts made with a glass bottle	light	-	-	1	4.8	-	-	-	-	-	-
Strikes made against machine stands	light	1	7.1	-	-	2	12.5	-	-	1	4.0
Strikes of a mobile press tablet	light	-	-	1	4.8	1	6.3	1	6.2	-	-
Strikes of a bale of textile rolls	light	-	-	-	-	-	-	-	-	1	4.0
Burns made with industrial steam	light	-	-	1	4.8	1	6.2	-	-	-	-
Squeezes on the sewing machines	light	-	-	-	-	-	-	-	-	1	4.0
Squeezes on the fixer press	light	-	-	-	-	-	-	1	6.2	-	-
Squeezes on the device for rivets	light	1	7.1	2	9.5	-	-	-	-	-	-
Strips and falls	light	-	-	2	9.5	1	6.2	3	16.8	-	-
Falls from bicycles	heavy	-	-	2	9.5	-	-	-	-	-	-
Traffic accidents	heavy	-	-	3	14.3	-	-	1	6.2	2	8.0
Total		14	100.0	21	100.0	16	100.0	16	100.0	25	100.0

Table 2. The number of injuries at work regarding kinds and sources of injuries

The results given in the Table 2 show that the greatest number of injuries was caused by machine pinpricks, which is expected since sewing machines are the base of the garment industry. The injuries made second place. It means that the band knife is until a great danger for the man - worker in spite of the protection. This can be explained with the lack of workers' concentration, big knife speed, and need for precise piece cutting of piles. The other damages are not so expressed.

It must be mentioned that all injuries made at work in the garment industry are qualified as light. Heavy injuries happened only in traffic accidents while workers commuted. If we subtract injuries happened out of work such as slips on the ice, cuts with glass, strips, falls from bicycles, traffic accidents to the total number of injuries, then, it can be fortunately stated that number of injuries at work in the garment industry is relatively low related to number of the employed.

The number of lost days as the result of injury leaves

A lot of working days were lost as given in Table 3 because of injuries happened in workers' commuting.

_				Y	e	a r					Total
Months	198	1985		1986		1987		1988		39	numb.
-	n	%	n	%	n	%	n	%	n	%	of days
January	47	43.9	-	-	26	14.8	10	4.3	-	-	83
February	-	-	10	3.9	17	9.6	14	5.9	5	2.1	46
March	4	3.7	15	5.8	14	8.0	10	4.3	42	18.1	85
April	5	4.7	35	13.5	24	13.6	-	-	29	12.6	93
May	14	13.2	17	6.5	10	5.7	10	4.2	7	3.0	58
June	-	-	107	41.4	10	5.7	14	6.0	24	10.4	155
July	-	-	-	-	10	5.7	10	4.3	-	-	20
August	-	-	-	-	-	-	-	-	20	8.6	20
September	30	28.0	22	8.5	40	22.7	-	-	-	-	92
October	7	6.5	24	9.2	-	-	-	-	21	9.0	52
November	-	-	29	11.2	10	5.7	135	57.4	36	15.5	210
December	-	-	-	-	15	8.5	32	13.6	48	20.7	95
Total	107	100,0	259	100,0	176	100,0	235	100,0	232	100,0	1009

Table 3. The number of lost days in months and years because of injury leaves

The greatest number of lost days as result of injury leaves in five studied years is in November (210 days) then June, (155 days). July and August are months for holidays, which explain why the least lots of number working days happened then.

CONCLUSION

The number of the injured workers in the garment industry "Inkol" ranges from 2,5% to 4,8% related to the average of the employed in the year. This information reveals that in processes of marking cloths there is no great number of injuries at work related to some other industry branches. Besides, these injuries at work are of light categories and they happened as the result of insufficient attention of workers or making wrong body movements.

The biggest number of injuries in "Inkol" happened because of machine pinpricks, quite comprehensible for sewing machines are very much used in making cloths. The second place take injuries happened on the cutting machines with circling knives

(bansek). The consequences of these injuries at work are: lost working days, on the average of 202 days a year, that undoable affect realization of plans for production and economical effects.

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IZVORI OPASNOSTI I KARAKTER POVREDA NA RADU U KONFEKCIJSKOJ INDUSTRIJI

Cvetko Z. Trajković, Dragan M. Djordjević

Industrija konfekcije je specifična grana po tome što se pri obavljanju pojedinih operacija rada troši i više od 70 % vremena na rukovanje predmetima rada. To zahteva veliku koncentraciju radnika, jer se pri obavljanju osnovnih pokreta rukama, šakom, prstima, očima, telom, nogom i stopalom mogu napraviti greške koje mogu izazvati povrede. Kako se nivo i rezultati zaštite na radu ogledaju, pre svega u kretanju povreda na radu, to su u ovom radu opisane najznačajnije karakteristike tehnoloških procesa izrade odeće sa posebnim osvrtom na izvore opasnosti. Praćenjem povreda na radu za period od 5 godina u konfekciji "Inkol" u Leskovcu, došlo se do vrlo zanimljivih podataka o vrsti i broju povreda. Ustanovljeno je da se broj povredjenih radnika u toku godine kreće od 2,5 do 4,8 % u odnosu na prosečan broj zapošljenih i da najviše povreda nastaju usled uboda mašinske igle. Zbog zadobijenih povreda na radu izgubljeno je prosečno 202 radnih dana godišnje.