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Studying on improving sewing process of the back pocket, the waistband of the basic Jeans

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Abstract:
Based on the codes of the MTM time measurement method and the GSD predictability time system, the study also gave some codes to build the time standard for assembling the back pocket and the waistband according to the traditional sewing processes (TSP). Then, combined with information about modern sewing equipment and time study, the research came up with several modern sewing processes (MSP) to replace TSP. The research results showed that when processing the back pocket using the back pocket hemming machine and the automatic back pocket setter machine, the ironing stage was eliminated, time-saving up to 73.5% and decreased to 66.66% of the number of operations compared to TSP; using the Kansai waistband sewing machine in combination with the folder saved time up to 65.15%; using the belt loop attaching machine saved time up to 66.7%; using the programming machine (to attach the leather label to Jeans) saved time up to 22.7% compared to TSP.

Keywords: jeans, automatic sewing machine, the GSD system…

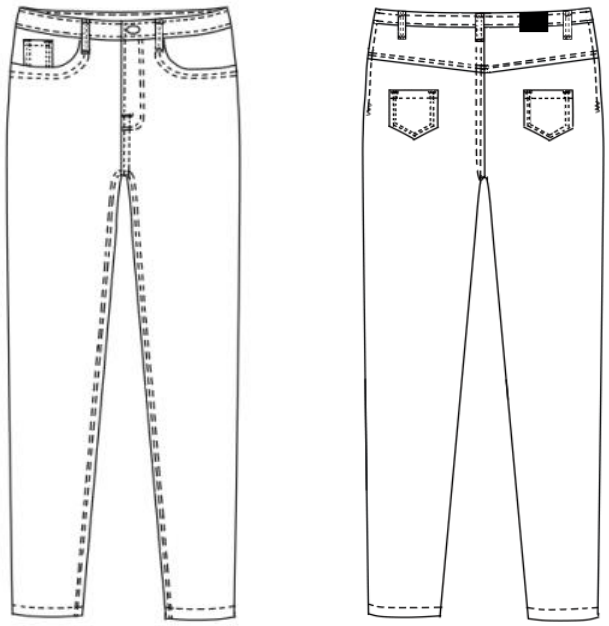
1. Introduction

In the world, there is the MTM time measurement method and the GSD predictability time system [1] to analyze manipulation and standardize the labor resources of the garment industry. The data have been standardized and encrypted in the order of movement while manipulating at each stage. The GSD predictability time system helps garment enterprises understand the overall production process, cost, and production time. In fact, in Vietnam, the analysis of manipulation is based on TSP to calculate the standard time of operations but is still limited in terms of data. Some major garment corporations already have standard time data banks but have not been updated regularly. Through the manipulation analysis for the back pocket and the waistband in the basic jeans noticed some general problems as follows: although the analysis process is based on standard manipulations, each work piece needs a lot of operations and each operation must perform a very large number of manipulations. Especially, the manipulations for additional activities are often repeated many times. Therefore, the total attrition time for additional activities is also very large. The product quality of each work piece is affected by a lot of factors. Therefore, the author group implements: "Studying on improving sewing process of the back pocket, the waistband of the basic jeans", contribute to improving productivity and product quality.

2. Empirical research

2.1. Subjects

2.1.1. The texture of the back pocket and the waistband in the Jeans (figure 1)

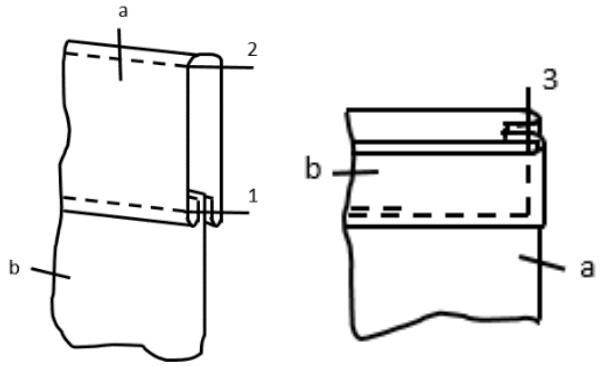
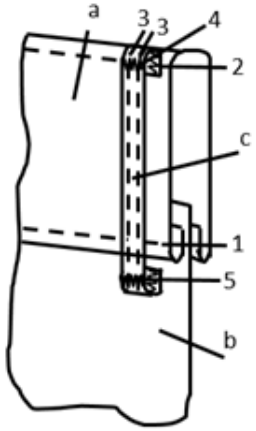


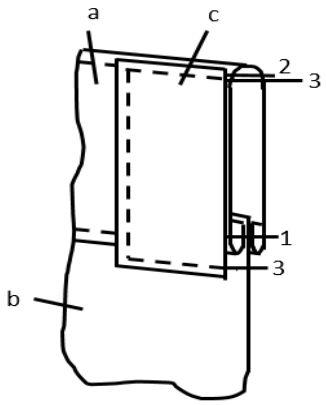
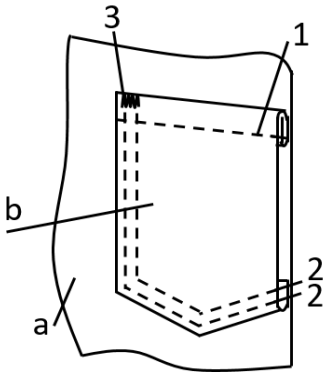
(a) (b)

Figure 1: Description of the basic

The texture of the waistband was studied in three cross-sectional positions: the regular waistband, the waistband with passants, and the waistband with the leather label. The description of the texture is presented in Table 1.

Table 1. Description of seam diagram

Element	**Illustration picture**	**Decription of operation**
a- Waistband b- Jeans body	**Regular waistband** 	1- Sew waistband to Jeans body 2- Topstitch waistband 3- Topstitch waistband corner
a- Waistband b- Jeans body c- Passant	**Waistband with passants** 	1- Sew waistband to Jeans body 2- Topstitch waistband 3-3- Make belt loop 4- Bartack the passant to waistband 5- Bartack the passant to Jeans body

a- Waistband b- Jeans body c- Leather label	**Waistband with leather label** 	1- Sew waistband to Jeans body 2- Topstitch waistband 3- Sew the leather label to Jeans
a- Jeans back body b- Back pocket	**Back pocket** 	1- Sew mouth back pocket 2-2- Sew back pocket to back body 3- Bartack the mouth back pocket

2.1.2. Equipments

The TSP used: One needle lockstitch machine JUKI DDL-5600NJ-7 (ONLM); One needle chainstitch machine MH-481-5 (ONCM); Double needle lockstitch machine JUKI LH 3528A-7 (DNLM); Bartacking machine LK-1900BN-HS (BM); Belt loop making machine MFB-2600 (BLMM) [2]; Steaming iron ES-3300P (SI) [3].

The MSP used: Pocket creasing machine Jeans TDJ-101AS/TDJ-101AZ (PCM) [4]; Back pocket hemming machine MB2001B BR T8720C 005 (BPHM) [5]; Automatic back pocket setter machine PFAFF 3589 (BPSM) [6] to process the back pocket; Kansai waistband sewing machine (KWSM) [7] to process the regular waistband; Kansai special belt loop making machine BLX2202C (SBLMM) [8]; Belt loop attaching machine MOL-254 (BLAM) [2] to process the waistband with passants; Programming machine AMS - 210EN- 1306 (PM) [2] to process the waistband with the leather label.

2.2. Contents

This study implemented the following three contents: The first was to determine the operations, the time to perform the operations for each work piece according to TSP. Then, found out the analysis of some MSP to replace TSP. The diagram to learn, analyze and propose some MSP is presented as in Figure 2. Finally, we conducted comparisons and evaluations to find out the strengths of each MSP.

2.3. Methods

For TSP used an analytical calculation method combined with the MTM time measurement method and the GSD predictability time system to determine the time standard to process the back pocket and the waistband. The time for a sewing process was analyzed into two types: one was the time of sewing/machining (calculated according to the formula) two was the time of handling elements (preparation for sewing). The unit used in the system was TMU and the conversion was 1 second = 27.8 TMU or 1 minute = 1667 TMU or 1 hour = 100 000 TMU. Research results were converted to units of seconds to consistency in comparison. In addition to the code symbols of the MTM method and the GSD predictability time system, 9 layers of human body activities were added encoding as in Table 2 for the convenience of the statistical process of activities.

Table 2. Encoding 9 layers of human body activities

No.	Activity	Code

1	Get and Put Data	G or P
2	Obtain and Match Part or Parts	M
3	Aligning and Adjusting	A
4	Forming Shapes	F
5	Trimming and Tool Use	T
6	Asiding	AF
7	Handling Machine	MF
8	Additional MTM data	AM
9	Sewing	S

As for MSP, the time study was applied on the clip recording the processing operations for the back pocket [9] [10] [11] and the waistband [12] [13] [14] [15].

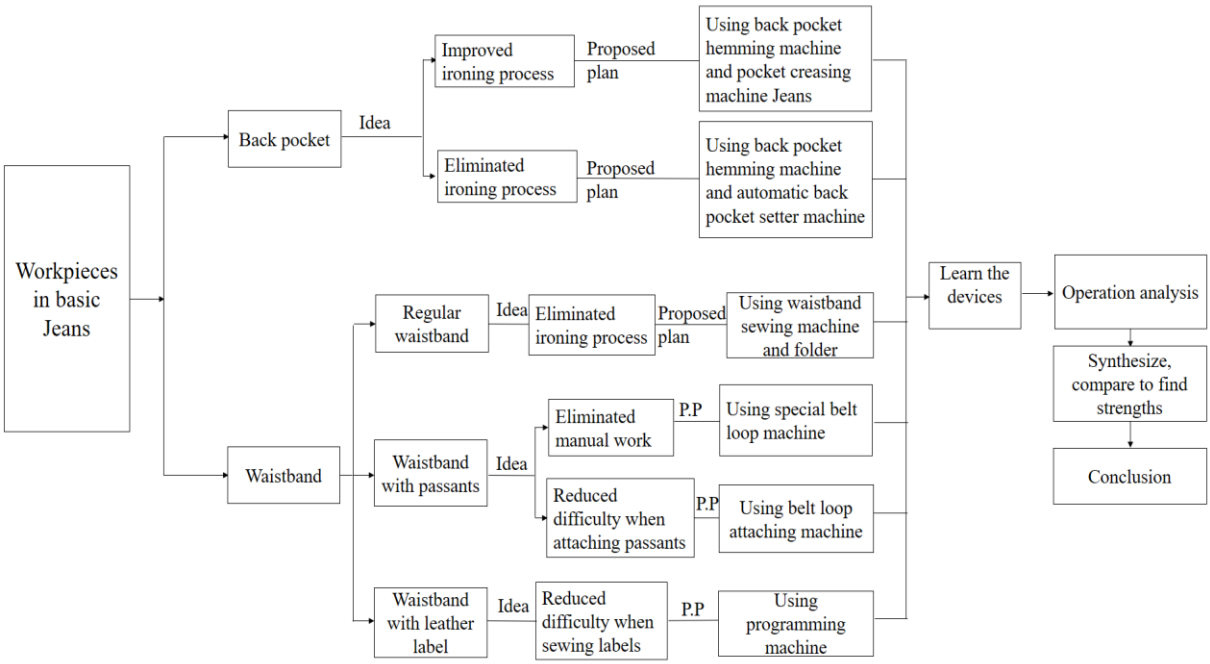


Figure 2: Diagram of steps to implement the research of MSP

3. Results

3.1. Studying time analysis and proposing to improve sewing process of the back pocket

Application of the MTM time measurement method and the GSD predictability time system obtained the results of analysis of processing time for the back pocket according to TSP as presented in Table 3.

Table 3. Analysis of processing time for the back pocket according to TSP

No.	Code	Frequency (times)	Time (TMU)	Time (s)
1	G&P	31	861	
2	M	3	132	
3	A	5	361	
4	F	20	334	
5	T	0	0	
6	AF	10	230	
7	MF	2	36	
8	AM	78	966.13	
9	S	7	327	
Total		**156**	**3247.13**	**116.8**

Looking at the results of Table 3, there were two types of activity: Get and Put data (code G&P) and Additional MTM data (code AM) appear several times. As such, the task needs to find solutions to reduce the number of these activities.

Within the scope of this study, two alternatives were proposed. Firstly, using BPHM in combination with PCM and the remaining stages such as marking the location of the pocket, sewing pocket, and bartacking mouth pocket were still processed as TSP. (Called option 1). Secondly, using BPHM in combination with BPSM to process the back pocket (Called option 2). After the process of observation, analysis, stopwatch, recording the results on the clip. The results are presented in Figure 3, 4 and Table 4.

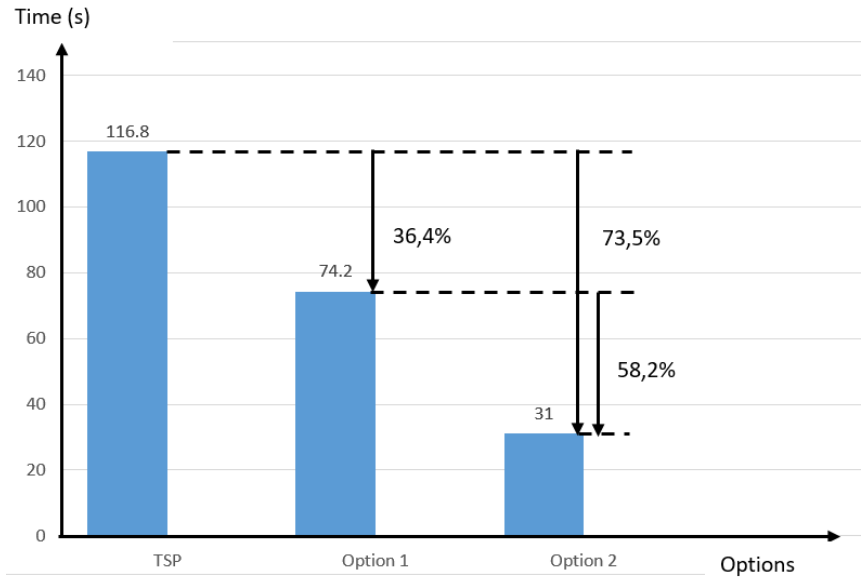


Figure 3: Compare the processing time

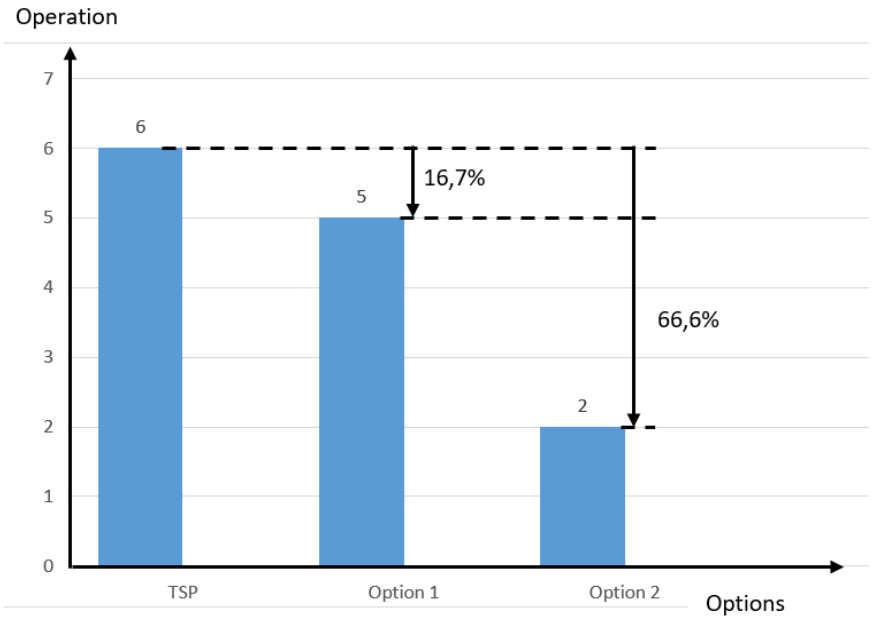


Figure 4: Compare the number of operations

Table 4. Analysis of processing time for the back pocket according to MSP

No.	Operation	TSP		Option 1		Option 2	
		Time (s)	Device	Time (s)	Device	Time (s)	Device
1	Iron mouth pocket	28.28	SI	0	0	0	0
2	Sew mouth pocket	5.5	ONLM	0	BPHM	10	BPHM
3	Iron pocket	39.8	SI	10	PCM	0	0
4	Mark the location of the pocket	9.5	Pen	9.5	Pen	0	0
5	Sew pocket to the back	25.3	DNLM	25.3	DNLM	21	BPSM
6	Bartack pocket	8.4	BM	8.4	BM	0	0
Total		**116.8**		**74.2**		**31**	

It can be seen: Option 1 eliminated the stage of ironing mouth pocket and reduces the difficulty in the stage of ironing pocket body. Option 2 eliminated the stage of ironing. On the other hand, option 2 saved time up to 73.5% compared to TSP and 58.2% compared to Option 1. If you look at the number of operations, option 1 reduced 16.7% and option 2 decreased to 66.66% of the number of operations compared to TSP. Specifically, it can be shown that the reduction of operations: ironing, marking the location of the pocket and bartacking pocket.

3.2. Studying time analysis and proposing to improve sewing process of the waistband

The waistband was divided into 3 parts: the regular waistband, the waistband with passants and the waistband with a leather label.

3.2.1. The regular waistband

The assembly process of the regular waistband consists of ironing and folding the waistband, sewing the waistband to body jeans, and topstitching waistband. The results of the time analysis for operations performing the assembly process are analyzed in Table 5.

Table 5. Analysis of processing time for the regular waistband according to TSP

No.	Code	Frequency (times)	Time (TMU)	Time (s)
1	G&P	21	432	
2	M	3	114	
3	A	11	616	
4	F	23	286	
5	T	0	0	
6	AF	5	134	
7	MF	8	144	
8	AM	152	1852.42	
9	S	13	649	
Total		**236**	**4227.42**	**152.07**

Looking at the results of the time analysis for the processing activities of the regular waistband according to TSP find that the additional MTM data (code AM) have a high frequency and repeat several times. Therefore, it is necessary to improve operations to minimize additional MTM data.

The KWSM is combined with the folder (figure 5) to conduct simultaneous sewing waistband and folding waistband corner, ONLM to topstitch waistband corner. Then, compare and evaluate the effectiveness

between the two options: Option 1 is according to TSP, and option 2 is to use KWSM. The results of the time analysis are presented in Table 6 and Figure 6, 7.

Figure 5: The folder

Table 6. Analysis of processing time for the regular waistband according to options

Operation	**Option 1**		**Option 2**	
	Time (s)	**Device**	**Time (s)**	**Device**
Iron the waistband	80.5	SI	0	0
Sew the waistband to body of Jeans	24.9	ONCM	25	KWSM
Topstitch the waistband	13.4	ONCM		
Topstitch the waistband corner	33.27	ONLM	28	ONLM
Total	**152.07**		**53**	

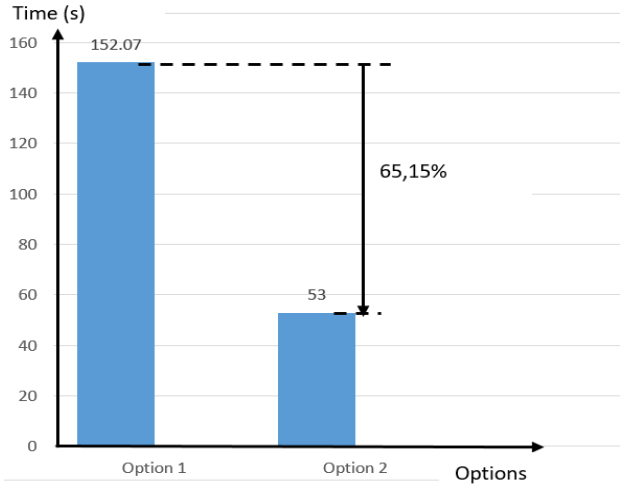


Figure 6: Compare the processing time

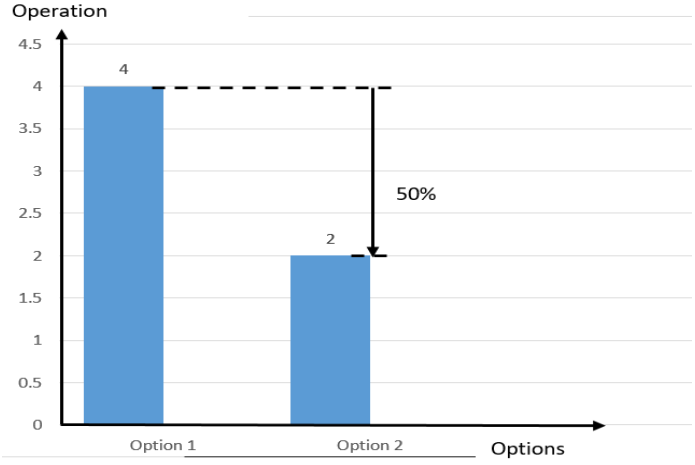


Figure 7: Compare the number of operations

The results of the study show that option 2 had an outstanding processing time, reducing processing time by 65.15% compared to TSP, in addition to the number of operations reduced by half and eliminated ironing operations. Two operations (sewing waistband to a body of jeans and topstitching waistband) were integrated into one operation. Product quality was more uniform, reducing complexity when sewing waistband to a body of jeans, folding waistband corner, and topstitching waistband corner.

3.2.2. The waistband with passants

According to TSP, sewing passants to the waistband consists of sewing passants, cutting into passants, and sewing passants to the waistband. Apply MTM method and GSD predictability time system to analyze the time for waistband with passants according to TSP. The aggregate results are presented in Table 7.

Table 7. Analysis of processing time for the waistband with passants according to TSP

No.	Code	Frequency (times)	Time (TMU)	Time (s)
1	G&P	9	231	
2	M	12	525	
3	A	6	195	
4	F	6	258	
5	T	5	125	
6	AF	3	88	
7	MF	5	85	
8	AM	1	9	
9	S	2	106	
Total		**49**	**1622**	**58.4**

Table 7 shows the obtain and match part or parts (code M) repeated several times for processing sewing passants to the waistband. For this reason, two options that use modern equipments are proposed: Option 1 used SBLMM combined with BM to sew passants to Jeans. Option 2 used BLMM as TSP combined with BLAM. Then, conducted operations analysis, stopwatch, record processing time based on clips. The recorded time results are presented in Table 8 and are also specified as on Charts 8 and 9.

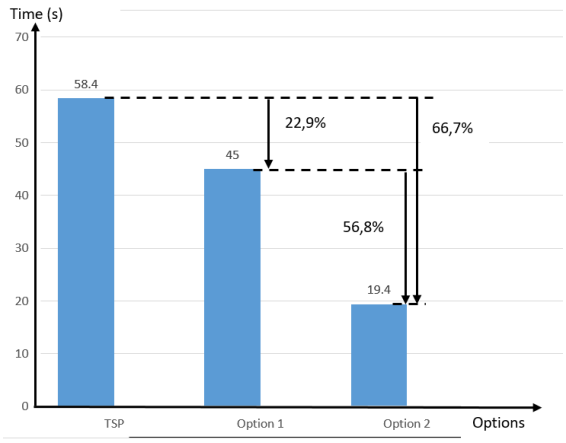


Figure 8: Compare the processing time

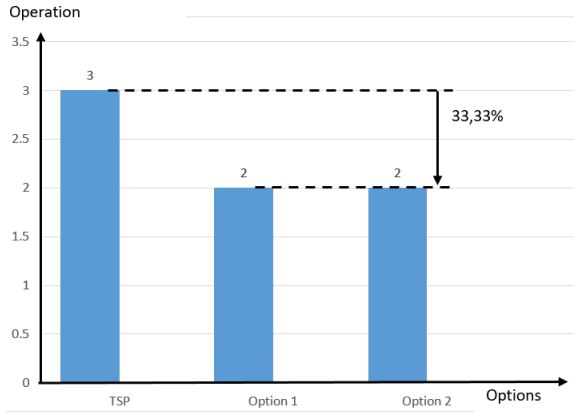


Figure 9: Compare the number of operations

Table 8. Analysis of processing time for the waistband with passants according to options

No.	Operation	TSP		Option 1		Option 2	
		Time (s)	Device	Time (s)	Device	Time (s)	Device
1	Make belt loop	8.4	BLMM	7	SBLMM	8.4	BLMM
2	Cut into passants	12	Scissors			11	BLAM
3	Sew passants to jeans	38	BM	38	BM		
Total		**58.4**		**45**		**19.4**	

Option 2 (using belt loop attaching machine) has superior processing time compared to the other two options, reduced the time by 66.7% compared to TSP and 56.8% compared to option 1. Moreover, the sewing passants to jeans, operations were removed such as adjusting, folding the passant and being able to attach passants simultaneously to jeans. Since then, not only has productivity increased but also product quality has become almost uniform.

3.2.3. The waistband with a leather label

Sewing leather label to the waistband was performed after sewing completely waistband to a body of jeans. The results of the analysis of the activities of the operations are presented in Table 9.

Table 9. Analysis of processing time for the waistband with the leather label according to TSP

No.	Code	Frequency (times)	Time (TMU)	Time (s)
1	G&P	2	66	
2	M	2	94	
3	A	3	225	
4	F	0	0	
5	T	0	0	
6	AF	1	23	
7	MF	2	36	
8	AM	1	9	
9	S	4	195	
Total		**15**	**648**	**23.3**

At the location of the leather label, the team proposed another option besides TSP. It used PM (called the proposed plan). Observe clips, analyze operations, stopwatch, record operations, and process time. The results are aggregated in Table 10 and compared as on Chart 10.

Table 10. Analysis of processing time for the waistband with the leather label according to options

Operation	TSP		Proposed plan	
	Time (s)	Device	Time (s)	Device
Sew leather label to Jeans	23.3	ONLM	18	PM
Total	**23.3**		**18**	

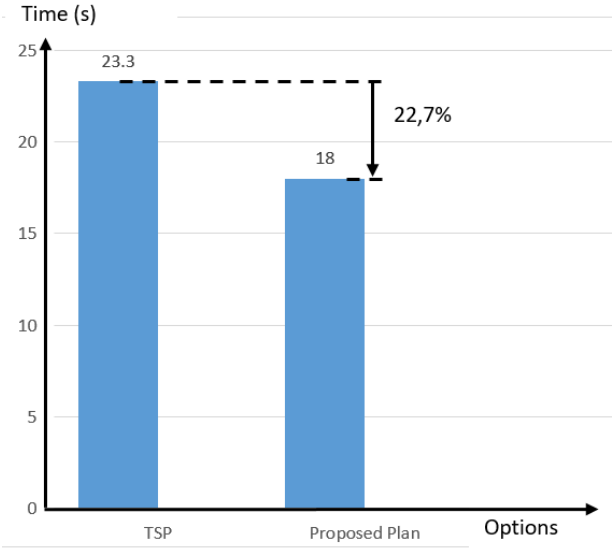


Figure 10: Compare the processing time

The processing method using PM reduced the time by 22.7% compared to TSP. In terms of performing label sewing, most operations were removed only get and put activities (code G&P). Therefore, the quality of sewing labels uniformly overcame stitch distortion, broken topstitch, and incorrect basting stitch when sewing.

4. Conclusion

After conducting a time analysis study and proposing to improve the sewing process of the back pocket and the waistband of basic jeans product, some conclusions were shown as follows:

- Some options were proposed to use modern equipment at some stages of sewing the back pocket, sewing waistband, sewing belt loop and sewing passants, the leather label to jeans.

- The proposed plan for the back pocket processing assembly when using BPHM in combination with BPSM eliminated the ironing stages. Saved time up to 73.5% compared to TSP, decreased to 66.66% of the number of operations compared to TSP. For the regular waistband when using KWSM in combination with the folder saved 65.15% of processing time compared to TSP. The option which used BLAM saved 66.7% of processing time compared to TSP, removed folding and adjusting passants. Operations (sewing the leather label to Jeans) using PM saved 22.7% of processing time compared to TSP.

Thus, the proposed improvement options saved significant time as well as the number of operations compared to TSP. That will help garment enterprises improve productivity and product quality as well as modernize production processes, reducing dependence on operations.

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Author Profile

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