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Development of The Yarn Sorting Equipment (khonhook) by Slide Way

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Abstract

Development of the yarn sorting equipment (khonhook) by slide way due to the principle of engineering that cause of workers on the long of motion time. The data was collected from the weaving group Ban Nongkok village, Nakornratchasima Province, THAILAND. According to the study, the step of yarn sorting (konhook) was one of the steps that affect long of motion time. The problem was the inadequate capacity equipment. The objective of research was to study and develop the yarn sorting equipment (konhook). The fabric used in the study was 64 meters in length and 1 meter in width.

Researchers studied the processes the yarn sorting (konhook) which it consists of seven sub steps, 1) the thread tube setting, 2) yarn bunching, 3) tying a knot at the end of yarn, 4) looping the yarn into a pillar, 5) sorting the yarn (konhook), 6) crossing pillars and 7) taking out the yarn. Researchers focused on studying yarn sorting process (konhook) by designing and creating a device for yarn sorting (konhook) for reducing yarn sorting (konhook) time by the original method performance indicators.

The results found that the developed yarn sorting equipment (konhook)) by slide way could reduce working time from 7.24 minutes to 6.08 minutes of the original equipment yarn sorting (konhook). This means it could make the process 16.02 % faster. This also helps reducing the distance of workers' movement from 2,234 meters to 8 meters. This is 99.64 % shorter

Keywords*: yarn sorting (konhook) / yarn sorting equipment (konhook) / yarnRead energy, comfort*

1. INTRODUCTION

Textile is the one of four basic of human needs [1] and it shows the treasure of culture in each county. In 2013, Thailand exported the textile 3,166.48 million US dollar, decreasing 18.25 % when compared with the same time in 2012 (Thai textile information department). It started to develop textile, grouping the similar product for Simi-Industry

The researchers chose the best product from Nakornrachasima province that had a standard in production. The process of weaving was started by yarn bunching. There were two types of yarn they are standing yarn

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and line up yarn. The tools for standing yarn were tube setting, 17 pillars and way 4 meters. This production state used human labor and skills for the yarn's length 64 meters and wide 1 meter. The human labor might be walk 17 rounds about 2,234 meters for 1 yarn.

In this objective study, the yarn sorting equipment was designed and development in motion and time study. To reduce the working time and long distance for high efficiency.

2. PREPARING AND EXPEREMENTAL

2.1 Process of the yarn sorting equipment (Original).

1. The thread tube setting: starting from prepared tube yarn in pillar 66 tubes. Show in figure 1.

Figure 1. The thread tube setting

2. Yarn bunching: after setting the tubes the worker might collectable the yarn and bunch it together. Show in figure 2.

Figure 2. Yarn bunching

3. Tying a knot at the end of yarn: at the end of yarn would not equal the worker try to knot it. Show in figure 3.

Figure 3. Tying a knot at the end of yarn

4. Looping the yarn into a pillar: after the yarn was knotted, it would be hold in the first pillar. Show in figure 4.

Figure 4. Looping the yarn into a pillar

5. Sorting the yarn (konhook): standing yarn was prepared in this step. After hold the yarn in the pillar, the worker used the bamboo wood in the character of circle 25 cm. This tool used for pull the yarn from the one pillar to another pillar. The worker might walk to switch from left to right in all pillars about 17 rounds. Show in figure 5.

Figure 5. Sorting the yarn (konhook)

6. Crossing pillars: this step was switching and sorting the yarn in zigzag way. Show in figure 6.

Figure 6.Crossing pillars

7. Taking out the yarn: the yarn was bringing out after finished. Show in figure 7.

Figure 7. Taking out the yarn

2.2 Analysis problem by cause and effect diagram.

From the process 2.1, the researchers analyze the problem that cause from human capacity in the step of sorting yarn by cause and effect diagram. Show in figure 8. The way to solve this problem was development the tool of sorting yarn to reduce the motion and time study.

2.3 The way to design the equipment of sorting yarn.

1. The tool of sorting yarn were discussed the problem and studied the possibility in design the standing yarn. Due to the sorting yarn was not suitable for motion, it used 192 minutes for one process. This equipment was an important for workers to get the good product and reduce the lead time.

2. To analysis and design the equipment, the sorting yarn was developed to use in easily way and simple for worker. Show in Figures 9 -10.

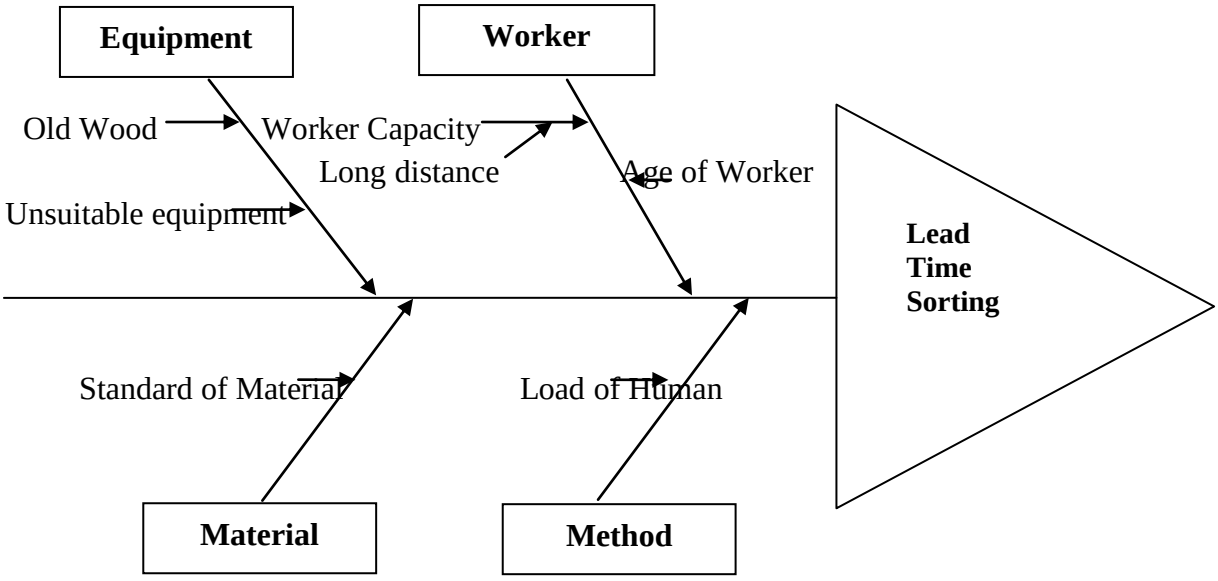

Figure 8. Lead time of sorting yarn by cause and effect diagram

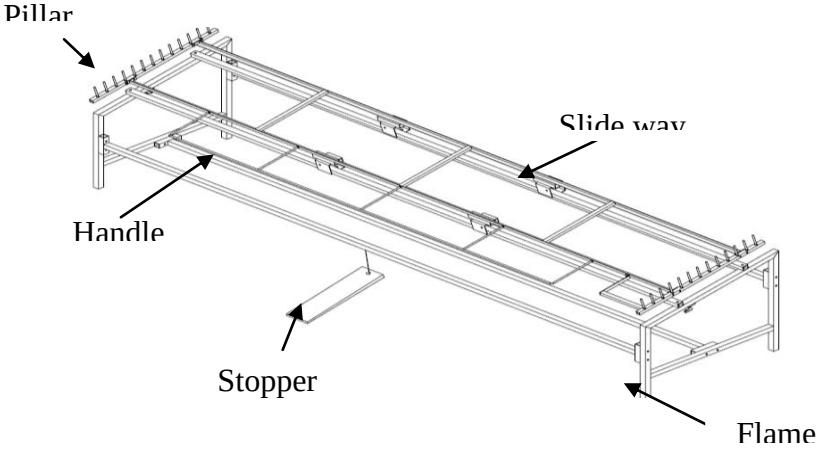

Figure 9. Design of the yarn sorting equipment

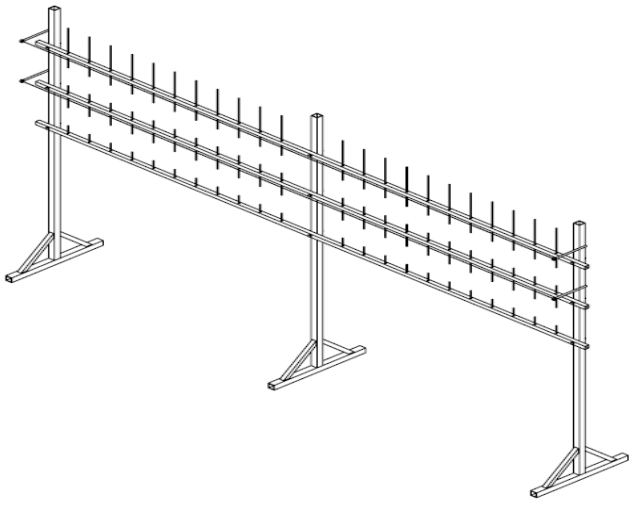

Figure 10. Design of the thread tube setting

3. RESULT AND DISCUSSIONS

3.1 Process of the yarn sorting equipment by Slide Way.

The thread tube setting: Figure 11 shows the tube setting that tubes would be counted by the worker. The tube would be put it on the pillar and the yarn would be collectable for sorting.

Figure 11. The thread tube setting (Modify)

Yarn bunching, tying a knot at the end of yarn and looping the yarn into a pillar were used in the traditional way. Shows in Figure 12 - 14

Figure 12. Yarn bunching (Modify)

Figure 13. Looping the yarn (Modify)

Figure 14. Tying a knot at the end of yarn (Modify)

5. Sorting the yarn (konhook) by Slide Way: Figure 15 shows the details of sorting yarn equipment. First step, the worker stands at the center of the sorting yarn equipment and used the handle slide sorting yarn hold with pillar. The sliding sorting yarn would move from left to right until the end of work.

Figure 15. Sorting the yarn (konhook) by Slide Way

Crossing pillars and taking out the yarn were used in the traditional way. Shows in Figure 16-17

Figure 16. Crossing pillars (Modify)


Figure 17. taking out the yarn

3.2 Results

The slide sorting yarn was test in one round sorting. The result shows in table 1, sorting the length yarn 64 meters and wide 1 meter the basic round of worker walk 30 times, the average time 181.06 minutes and standard deviation 0.04.

Table1. Flow process chart to analyze the data of sorting yarn after development.

Flow process chart of sorting yarn by slide way.				
Chart 01 number 1	Symbols	Traditional	Modify	Improved
Process : Sorting yarn by slide way.	Operation ○	4	4	0
	Transportation ⇨	2	2	0
	Delay D	-	-	-
Traditional □ Modification ⊘	Inspection □	1	1	0
Location : Nakornrachasima	Storage ▽	1	1	0
Noted : Jittiwat Nithikarnjanatharn	Distance (meter)	2,235	8	2,227
Proved : Asst.Prof. Manote Rithinyo	Time (minute)	217.47	181.06	36.41

3.3 Discussions

From the result, the slide sorting yarn was improved by comparing with time and distance. The standard time of sorting yarn was 217.47 minutes/round, for slide sorting yarn 181.06 minutes/round reduced working time 16.74% (Show in table1). The distance of worker walked for sorting yarn was 2,235 meters/round after used slide sorting yarn 8 meters/round reduced walking distance 99.64%

From the above, the researchers found that the sorting yarn's time was reduced only 16.74% because the slide way still use in 6.08 minutes/pillar. The slide sorting yarn tool was not support for reduced the time. On the other hand, the slide sorting yarn would reduce the distance of walk in 99.64%.

Analysis the efficiency of the slide sorting yarn found that it could sorting yarn 169.6 meter/day more than traditional sorting 126.72 meter/day.

4. CONCLUSION

The researchers solved the problem by engineering knowledge to develop the sorting equipment. The slide sorting equipment could reduce the distance of worker's walking in motion and time study. The

researchers compared the traditional sorting yarn and slide sorting yarn. The slide sorting yarn could reduce the time 217.47 minutes/round to 181.06 minutes/round (16.74%). The distance of worker walking reduced from 2,235 meters/round to 8 meters/round (99.64%).

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