

To Reduce Non-Productive Time in Garment Industry

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Abstract

In this research, root-cause identification methodology has been adopted to eliminate the non-productivities activities in sewing operation in apparel manufacturing. The fast changing economic conditions, such as global competition, declining profit margin, customer demand for high quality product, product variety and reduced lead-time etc. This play a major impact on apparel manufacturing industries. For any industry cost and time related to production and quality management or wastages reductions have important impact on overall expenditure. Emphasizing on each operation of sewing section steps has been taken to investigate and eliminate non-productive time in order to save time and cost and lessen internal process time. The outcome of this observation reflected that an industry may gain higher productivity and profitability by eliminating non-productive activities. NPT analysis of efficiency saves 28% losses and 54.67% improvement takes place in number of pieces produced and it saves 57.71% cost of production due to minimisations in machine break down, line setting and basic amenity.

Keywords- Sewing Machines, Line Balancing, Machine Operators, I.E department.

I. Introduction

Garment manufacturing units are now focusing on the improvement of overall efficiency. But they have many problems in their cutting, sewing and finishing sections. Now there efficiency level is not appreciable which is between 40-50% and the reason behind it is practicing huge amount of non-value activities. The problem is encountered in the initial processing of the sewing section. The capacity utilization of section is around 40% to 65% due to problems of non-value added time at each operational process. But, no root causes are identified as to why there is such a problem. This reason is one of the key contributory factors for the lower level of productivity. The different operation is performed in sewing section but how far it is related to or it is influencing the production processes had never been studied earlier. For this the loss of the company have been shown every hour by the using the Standard Allowed Minutes (SAM) with or without non value activities. Here Standard Minute Values (SMV) of different activities has also been shown which are calculated in both ways of considering the non-productive activities.

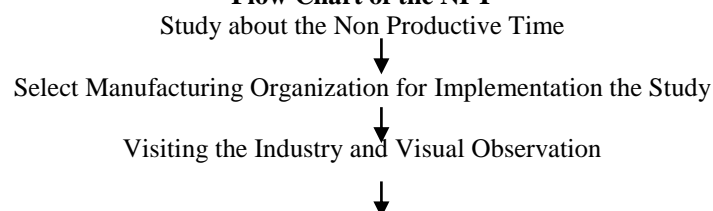
NPT in Industrial Engineering term is Non-Productive Time. Time that is spent by an operator without producing any garment (standard minutes) like 'set up time' is called non-productive time. In garment production Non-productive time is measured to analyze how much standard time is lost due to machine down time. Lost time is recorded to show management a reason for low production in a particular day or lower line efficiency. Here are few example of lost time.

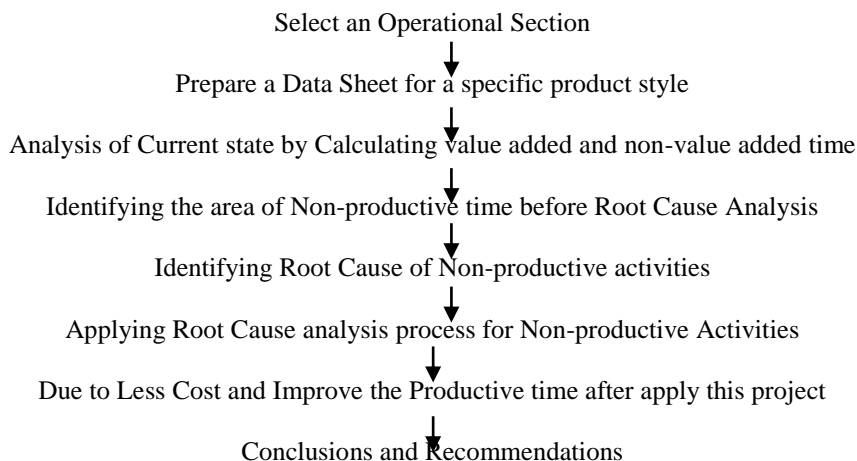
1. Line setting
2. Machine Breakdown
3. Cutting not available
4. Stitching Quality issue
5. Cutting quality problem
6. Power failure
7. Change of Feeding Plan
8. Basic Amenity

How to capture NPT

Provide a printed format to each line. Make one person responsible (line feeder, work study officer or line supervisor) to record lost time in total man minutes in the format. During production hours whenever you see operators to sit idle, find the reasons of not having work (or not doing the task) and note down start time and stop time, according due to sample format. In case multiple operators are sitting idle for the same reason multiply lost time by number of operators to calculate total man-minutes lost and record on your NPT format. Lost time recorded under the category need to be approved by supervisor or authorized person. At the end of the day calculate total lost time in each category.

Flow Chart of the NPT





I have identify major problems in sewing line like that line setting, waiting for work, repair work in production line, no feeding, quality issue etc. These are the few example of loss of time. Different non-productive works have a great impact on productivity. Higher non-value added activities, higher standard minute value (SMV) leads to less final time of each step involved. After that effective suggestion and recommendations are made to reduce the non-productive time.

Experimental Work

Garment – T-Shirt (Men)

Style – L/S M'S CREW NECK TEE

Fabric – 100% cotton knitted fabric with single jersey structure

GSM – 165



Single knitted jersey fabric

Table No.1 Non-Productive Record format (before 15days according to format)

Non Productive Time Record Format											
Day	LINE SETTING	MACHINE BREAK DOWN	CUTTING NOT AVAILABLE	QUALITY ISSUE OF STITCHING	CUTTING QUALITY PROBLEM	LOSS DUE TO FEEDING	CHANGE OF FEEDING	BASIC AMINITY	Total	Production / tgt - 1500	Efficiency
1		19 min	45 min	16 min		14 min		24 min	118 min	700 pcs	46.66%
2		14 min				28 min		66 min	108 min	800 pcs	53%
3	147 min	36 min		10 min		30 min		39 min	265 min	800 pcs	53%
4	40 min					61 min		55 min	156 min	850 pcs	56%
5		27 min	27 min					36 min	89 min	900 pcs	60%
6		10 min	90 min			20 min	20 min	27 min	167 min	750 pcs	50%
7		24 min				14 min	10 min	45 min	93 min	900 pcs	60%
8	103 min	47 min				15 min		31 min	196 min	650 pcs	43%
9		15 min				28 min	5 min	58 min	106 min	800 pcs	53%
10		16 min		15 min		35 min	10 min	39 min	105 min	800 pcs	53%
11		27 min	42 min					49 min	118 min	700 pcs	46%
12	55 min	10 min				40 min		42 min	147 min	700 pcs	46%
13		15 min				25 min		63 min	103 min	850 pcs	56%
14	40 min	22 min				41 min		31 min	124 min	600 pcs	40%
15		35 min				35 min	15 min	50 min	135 min	700 pcs	46%

Table No.2 Non-Productive Record format (after 15days according to format)

Non Productive Time Record Format											
Day	LINE SETTING	MACHINE BREAK DOWN	CUTTING NOT AVAILABLE	QUALITY ISSUE OF STITCHING	CUTTING QUALITY PROBLEM	LOSS DUE TO FEEDING	CHANGE OF FEEDING PLAN	BASIC AMINITY	Total	Production /tgt - 1500	Efficiency
1		3 min				8 min	6 min	8 min	25 min	1250 pcs	83%
2		8 min				12 min	7 min	10 min	37 min	1100 pcs	73%
3		7 min				10 min		15 min	32 min	1250 pcs	83%
4		6 min				10 min		15 min	31 min	1170 pcs	78%
5	20 min	3 min				2 min		7 min	32 min	1150 pcs	76%
6		9 min				11 min		9 min	29 min	1200 pcs	80%
7						8 min	5 min	13 min	26 min	1350 pcs	90%
8		4 min				6 min		14 min	24 min	1250 pcs	83%
9		8 min				8 min		10 min	26 min	1100 pcs	73%
10	25 min	3 min				5 min		8 min	41 min	950 pcs	63%
11		3 min				10 min	3 min	12 min	28 min	1200 pcs	80%
12		5 min				6 min		11 min	22 min	1150 pcs	76%
13		8 min				10 min	5 min	12 min	35 min	1200 pcs	80%
14		7 min				8 min		8 min	23 min	1250 pcs	83%
15		3 min				4 min		11 min	18 min	1300 pcs	86%

Result & Graphical representation of NPT

Day	Before Improvement		After Improvement	
	Production (No.of Pieces /Shift)	Efficiency Loss %	Production (No.of Pieces/ Shift)	Efficiency Loss %
Day 1	700	54%	1250	17%
Day 2	800	47%	1100	27%
Day 3	850	47%	1250	17%
Day 4	800	44%	1170	22%
Day 5	900	40%	1150	24%
Day 6	750	50%	1200	20%
Day 7	900	40%	1350	10%
Day 8	650	57%	1250	17%
Day 9	800	47%	1100	27%
Day 10	800	47%	950	37%
Day 11	700	54%	1200	20%
Day 12	700	53%	1150	24%
Day 13	850	44%	1200	20%
Day 14	600	60%	1250	17%
Day 15	750	54%	1300	14%
Avg	770	49%	1191	21%

Table 3. Production and Efficiency Loss %.

Following table shows the losses in manufacturing cost required per shift

Before		After	
Day	Loss of Sewing due to NPT (Rs.)	Day	Loss of Sewing due to NPT (Rs.)
1	39,200	1	12,250
2	34,300	2	19,600
3	34,300	3	12,250
4	31,850	4	16,170
5	29,400	5	17,150
6	36,750	6	14,700
7	29,400	7	7,350
8	41,650	8	12,250
9	34,300	9	19,600

10	34300	10	26,950
11	39200	11	14,700
12	39200	12	17,150
13	31,850	13	14,700
14	44,100	14	12,250
15	36,750	15	9,800
Avg	35,770	Avg	15,124

Table 4. Loss of Sewing due to NPT Analysis

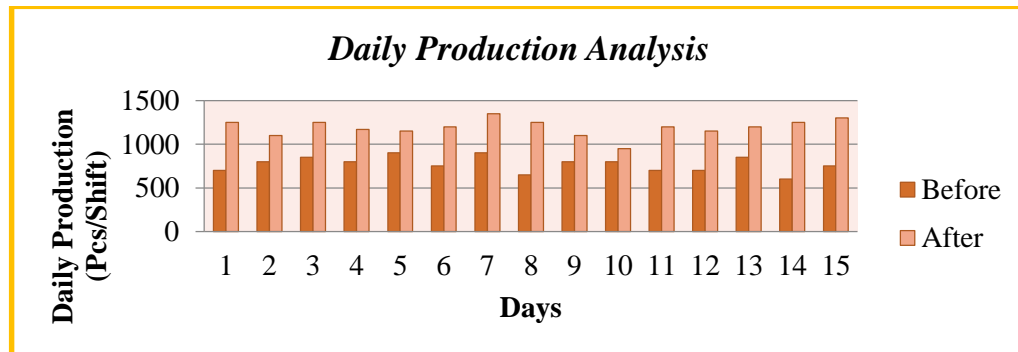


Figure 1. Daily Production Analysis

Inference: In figure 3 shows that daily loss of sewing due to NPT analysis there is 770 pieces produce before trial and 1191 pieces produce after trial of this project, so that NPT analysis shows 54.67% improvement in number of pieces. Due to avoided machine break down, line setting and basic amenity.

Efficiency Loss %

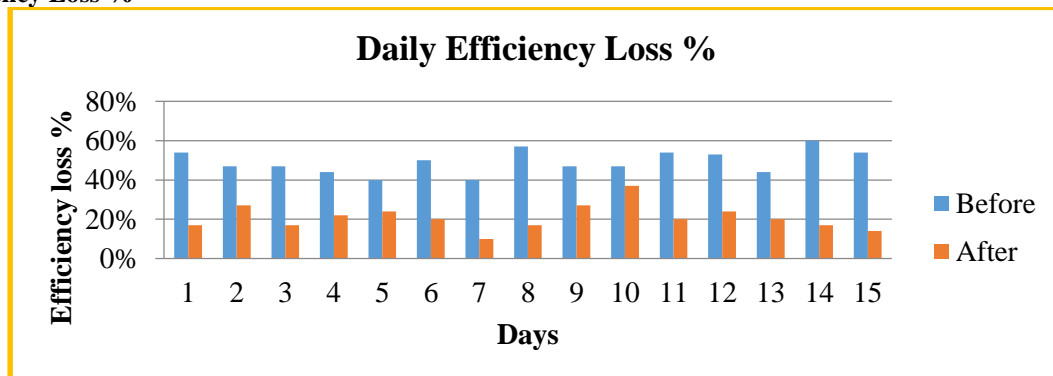


Figure 2. Daily Efficiency Loss % Analysis

Inference: In figure 3 shows that daily loss of sewing due to NPT analysis there is 49% loss before trial and 21% loss after trial of this project, so that NPT analysis of efficiency saves 28% loss due to avoided machine break down, line setting and basic amenity.

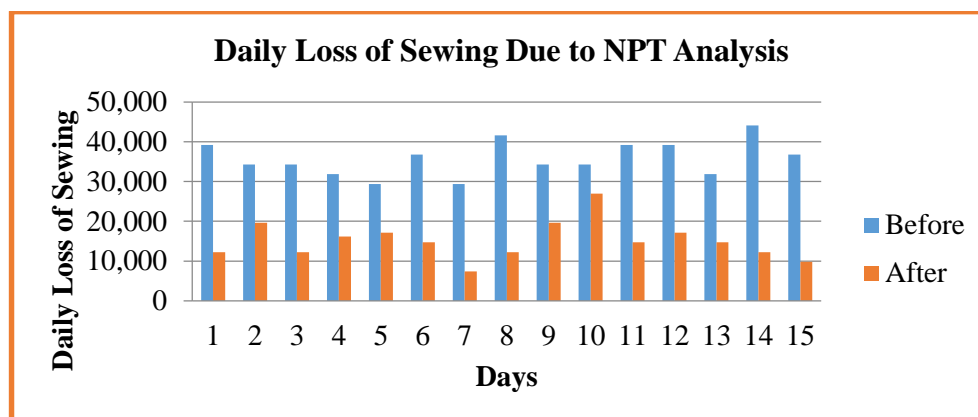


Figure 3. Daily Loss of Sewing Due to NPT Analysis

Inference: In figure 3 shows that daily loss of sewing due to NPT analysis there is 35,770 Rs loss before trial and 15,124 Rs loss after trial of this project. So that NPT analysis saves 57.71% loss. Due to avoided machine breakdown, line setting and basic amenity.

Reasons

We found that three major problem of sewing line machine breakdown, loss due to feeding and basic amenity this factor will be affected on productivity that is the loss due to non-productive time in garment manufacturing. We have already discussed study on non-productive time in details of this project. These are the following three factors find out due to loss time analysis. Before loss due to breakdown Avg 23 min and after improvement analysis loss time due to Avg 5 min. That means the 18% improvement of this factor. Before loss due to breakdown Avg 30 min and after improvement analysis loss time due to Avg 8 min. That means the 22% improvement of this factor. Before loss due to breakdown Avg 43 min and after improvement analysis loss time due to 11 min. That means the 32% improvement of this factor.

Conclusion

We found that sewing line is eight major factors are affected on NPT but loss time is very much affected by four major factor 1)Line setting 2)Machine breakdown 3)Loss due to feeding and last one is 4)Basic Amenity. These factors are responsible for Non- Productive Time. NPT analysis there is 49% loss before trial and 21% losses after trial of this project, so that NPT analysis of efficiency saves 28% losses. NPT are responsible for analysing the raw material, cutting, sewing and finish goods departments. Different non-productive works have a great impact on productivity. Higher non-value added activities, higher standard minute value (SMV) leads to less final time of each step involved. To survive in the very competitive market the factory must remove non value-added time between processes or in the process and also improve the current capacity efficiently and effectively. Both for including and excluding non-productive activities, then current state of root because analysis has been analyzed and various improvement proposals are identified to reduce the non-value adding waste. After that effective suggestion and recommendations are made to reduce the non-productive time.

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