



Faculty of Engineering
Department of Textile Engineering

Study of Non-Productive Time (NPT)

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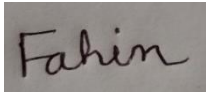
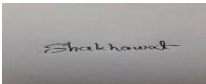
Assistant Professor

A thesis submitted in partial fulfillment of the requirements for the degree of
Bachelor of Science in Textile Engineering
Apparel Manufacturing Technology

7th July, 2021

DECLARATION

We hereby declare that the work which is being presented in this thesis entitled, “Study on Non-Productive Time (NPT)” is done by myself, has not been presented for a degree of any other university and all the resources of collected information for this report has been duly acknowledged.

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This is to certify that the above declaration made by the candidate is correct to the best of my knowledge

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**Faculty of Engineering
Department of Textile Engineering**

Approval Sheet

This research entitled “**Study on Non-productive time**” at Daffodil International University, June, 2021” prepared and submitted by Bm Fahim Rahman (ID#:172-23-5027), Km Shakhawat Hossain (ID#:172-23-5041) and Md Rajib Mia (ID#:172-23-5120) in partial fulfillment of the requirement for the degree of Bachelor in Science Textile Engineering has been examined and hereby recommended for approval and acceptance.

Supervisor

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ABSTRACT

A garment industry always focuses on higher productivity. They always try to deliver their goods with good quality on time. For this reason, to fulfill customer demand whole production system should be more capable and efficient.

Garment industry face so many problems during production. These problems are directly responsible for low level of productivity. NPT is one of them. NPT means non productive time. During working hours, the time spent by a worker without doing any value added activities like producing any garment is called non-productive time.

This report focuses on identifying the reasons behind NPT activities. Two different product line will be considered for analysing it. In the end, some overcoming points will be given which can help to reduce NPT activities and for achieving higher production.

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Figure 3.2.1.1 Complete front and Back picture of Jacket

CHAPTER 1

INTRODUCTION

1.1 Introduction:

The full meaning of NPT is non-productive time. In garment industry, garment manufacturers always face this term during production. NPT can be defined as the time which is spent by a worker without making any garment between the standard minutes. NPT is the key contributory factor which is directly responsible for lower efficiency in production. So, every garment industry measure NPT for different particular section which are associated with production for root cause analysis to find out the solution on this.

1.2 Objectives of this project:

1. To know the proper definition of non-productive time.
2. To find out the root causes on the occurring of non-productive time.
3. To calculate the non-productive time based on those causes.
4. To find out the way of eliminating non-productive time in order get higher efficiency on production.

1.3 Importance of this project:

With the help of this project a student can understand -

- What is NPT,
- The reasons for occurring this,
- How to calculate this,
- How to find a proper way for eliminating this.

For the factory-

- A factory only can manage (reduce) lost time in a specific sewing line when they measure it and they have enough data for decision making. This thesis report can help them to get those things.
- Unmeasured non-productive time is the potential area for productivity improvement. This project on NPT can improve the productivity by reducing lost time.
- This thesis report can also help to reduce the production lead time. So that a factory can shipping their goods on time.

1.4 Limitation of this project:

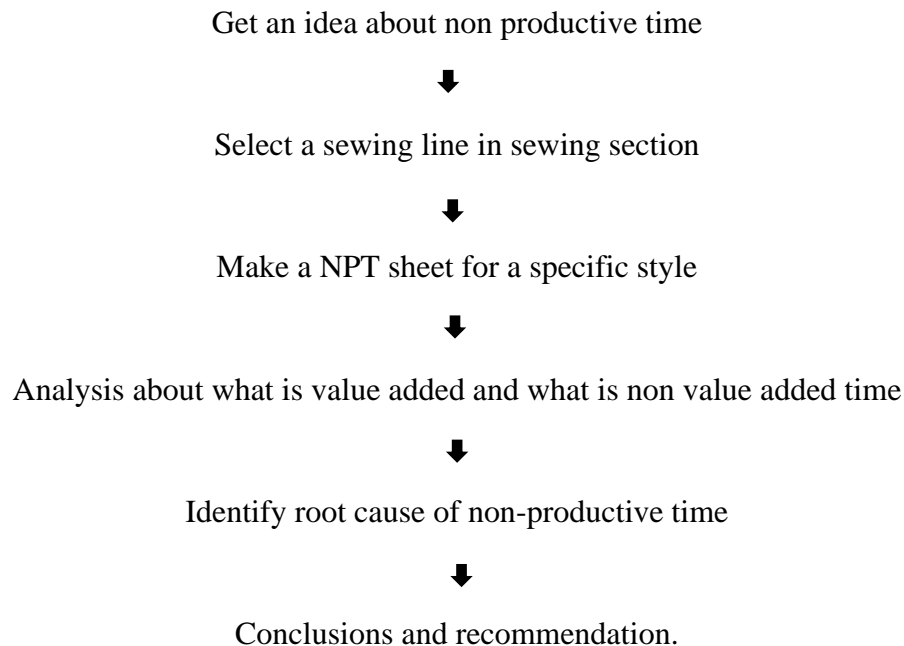
As the duration of our internship is two months, So, it was really difficult for us to find the deep root causes of NPT in the sewing section because we also have to visit all sections presents in the factory.

Some of the employers related to production section are not interested to give the information about non-productive time. So, it was quite tough for us to get the proper data about NPT. Then we try to find it by doing practical observations. And finally, we became success to find both data and reasons.

CHAPTER-2
2.LITERATURE SURVEY

2.1 How we capture NPT:

At first, we three select production line individually for 7 days observation. Then we take the responsibility to take the lost time in total man minutes. During working hours, we try to observe each non-productive activities like machine breakdown, cutting delay, power failure and many more reasons. We also try to keep our eyes on operators during the whole working hours and find out the reasons of not doing their tasks by note down start time and stop time. Then operators who effected by the same reason their total man-minutes lost can be calculated by multiplying lost time with no of workers. In the end of a day we get the total NPT .Lets see a flowchart about the identification of NPT-



2.2 Non productive time

As we already know the definition of NPT, we also have to know the common causes which are directly responsible behind this. If non-productive time increases, production efficiency will be decreases. There are 4 top most Non-Productive Measures in Garment Production that lower line efficiency. They are-

1. Waiting for work,
2. Cutting not available for loading,
3. Alteration and repair work in production line and
4. Line setting.

These non-productive measures can be also called as Efficiency Killers. Let's discuss on them-

1. Waiting for work: It means in a line operators sit idle due to no feeding from previous operators.

Possible reasons:

Poor line balancing,
operator absenteeism,
quality issues.

It is also observed that due to non-approval of trims makes operator to wait for a long time.

1. Waiting for work:

All operators may sit idle or few operators at the back sit idle for feeding next lay.

Possible reasons:

Insufficient fabric to cut and load,
Pending fabric approval to cut,
delay in cutting,
less cutting capacity or poor cutting plan.

2. Cutting not available: This is one of the major reasons which is responsible for non-productive time.

For this, All the operators or maybe few operators at the back of a sewing line sit idle for not getting cut parts for a specific style. Some common reasons –

1. For not preparing proper cutting plan
2. Take excess time to give cutting approval
3. Not storing sufficient fabric according to the targeted product quantity.
4. For not giving/doing day by day instructions/follow-up to the cutting section.

3. Alteration or Repair work: When required stitch quality is not made at first time, garment parts needs to open and stitch it again. This task is called repair work or alteration.

Possible reasons:

If the sewing m/c doesn't setup with proper speed then skip or broken stitch may be formed on garments which leads to repair work

Another reason is variation of shade in different of garments which leads to change parts.

If Quality check points are not available or insufficient quality checkers present in a line then repair work can be increase.

4. Line setting:

Possible Reasons:

In garments sewing section, Frequent change of styles in a line is common. It can happen due to small order which leads us to lower efficiency. The main reason behind this is shipment pressure of poor production planning. Sometimes due to small order run, rate of production efficiency losses. Also, sometimes line supervisors need to stop line without finishing current style and a new style is loaded without prior planning and resources. For this reason standard time loss .

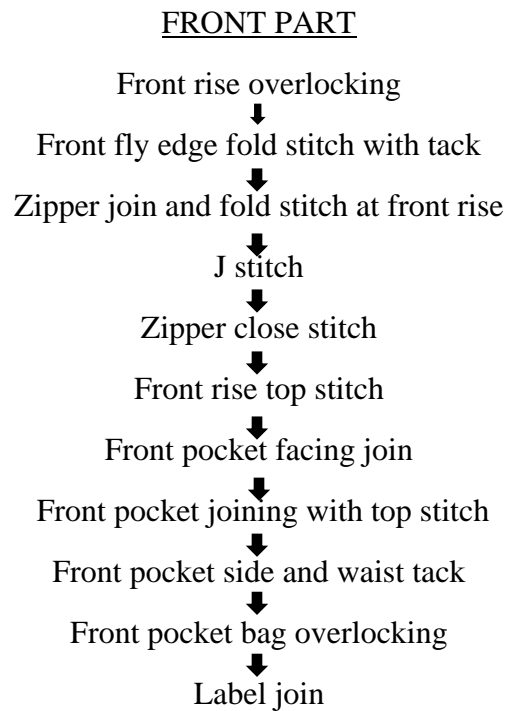
By doing better planning and good leadership done by supervisors and industrial engineers line setting time can be reduced.

Beside these there are some other reasons also. They are-

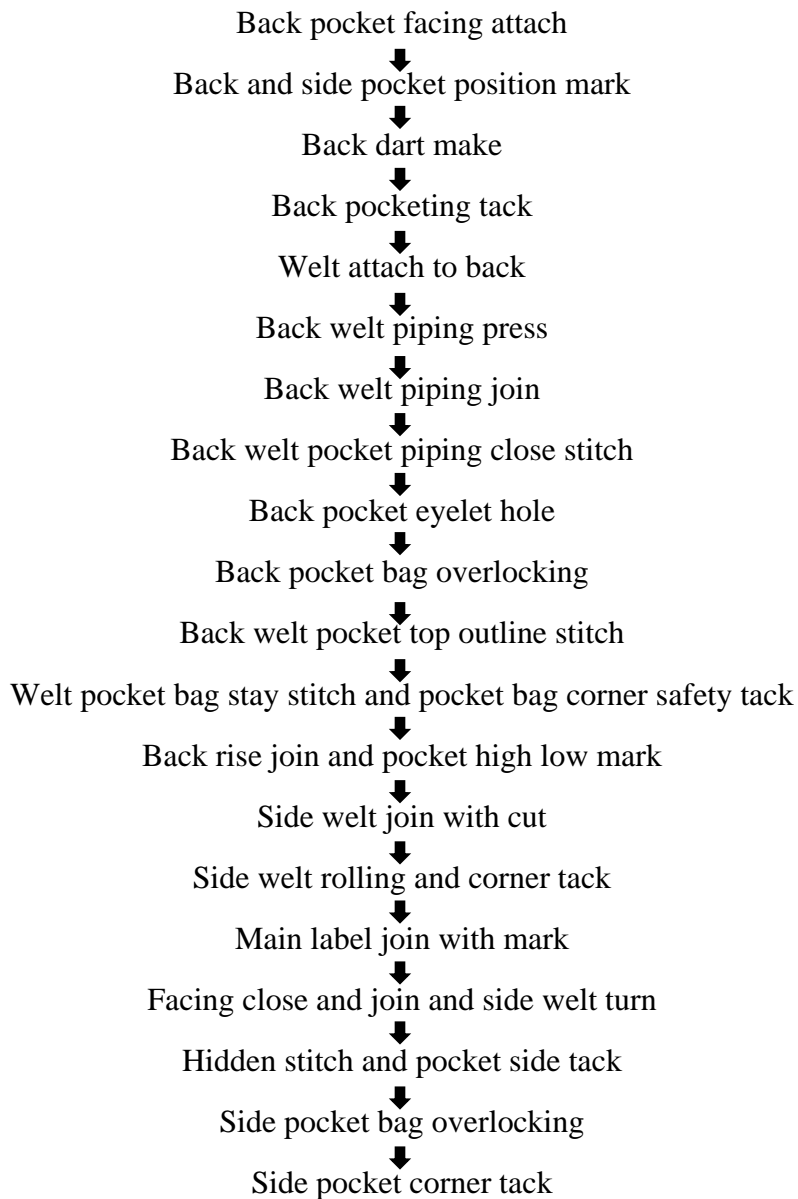
1. Machine breakdown
2. Decision making delay
3. Quality checking delay
4. Supervision problem
5. Man power crisis
6. Deduct hour

7. Cutting mistake
8. Cutting delay
9. Fabric approval delay
10. Color shading
11. Print mistake
12. Print delay
13. Embroidery delay
14. Embroidery mistake
15. Accessories delay
16. Salary delay effect
17. Garments delay.

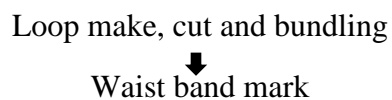
2.3 Production process of Side welt chino pant:



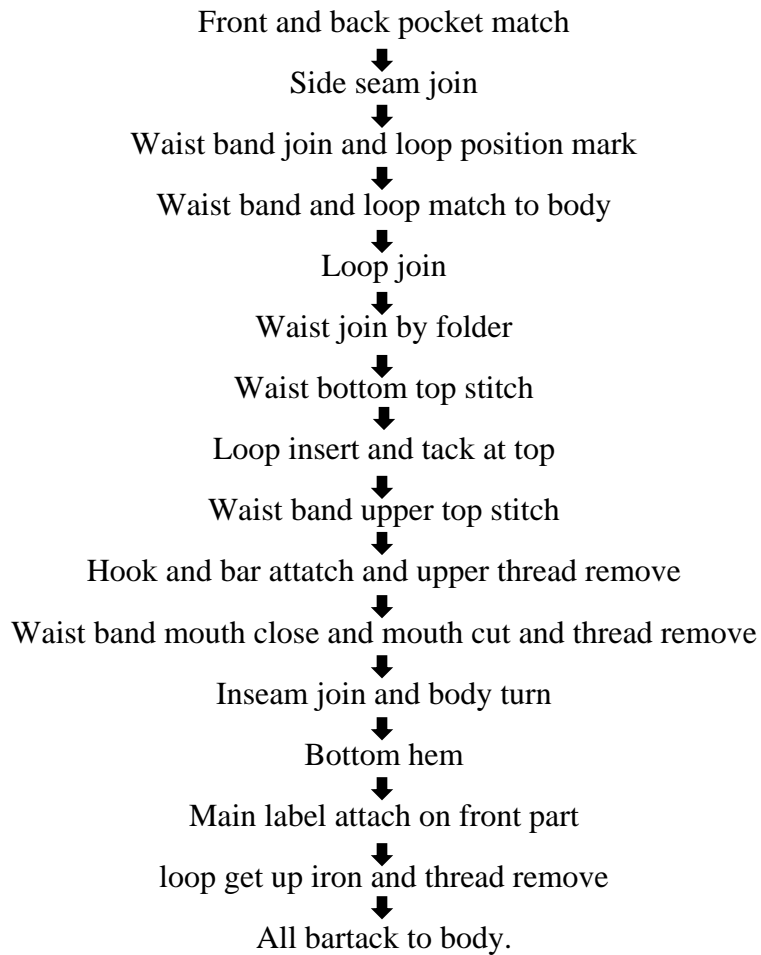
BACK PART



LOOP & WB

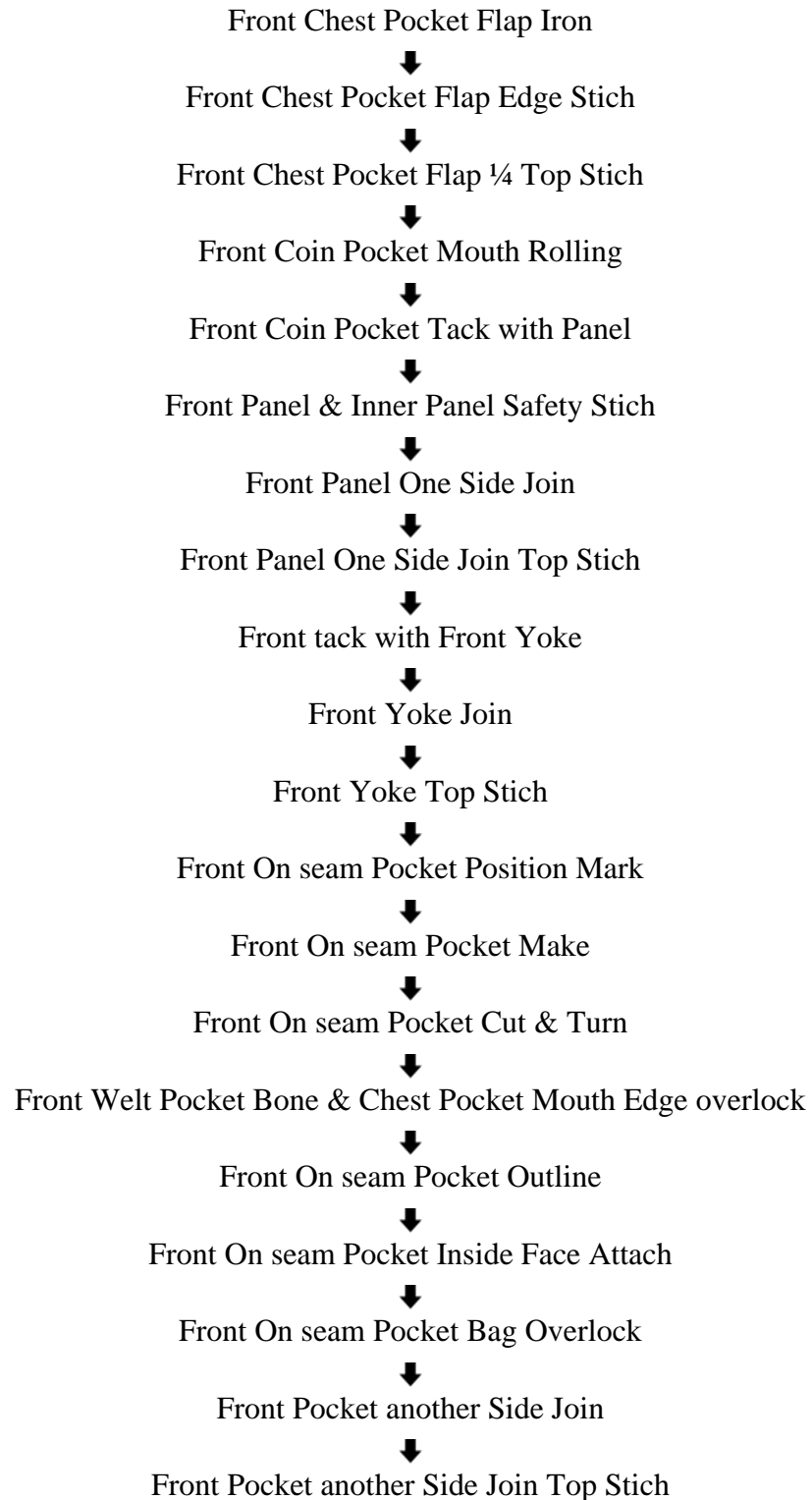


ASSEMBLY



2.4 Production Process of Jacket:

Front Part



↓
Front Coin Pocket Bottom Stich with mark
↓
Front Top & Bottom Placket Iron
↓
Front Top Bottom Placket Nose Make & Turn
↓
Front Top Placket Make
↓
Front Bottom Placket Make

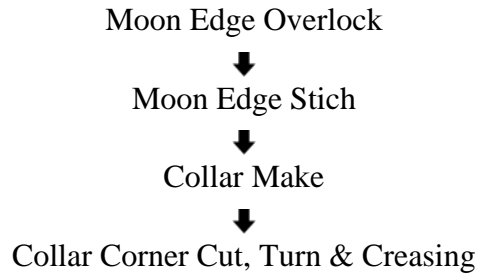
Back Part

Back Panel Make By Folder
↓
Center Back Panel Make By Folder
↓
Main & Size label cut & Attach Mark
↓
Main & Size Label Attach
↓
Back Yoke Join
↓
Back Yoke join Top Stich
↓
Back Yoke Deco Stich

Sleeve & Cuff Part

Waist Bottom Tab Iron
↓
Waist Bottom Tab Make
↓
Sleeve Panel Safety Stich
↓
Sleeve Placket Top Slit Make
↓
Sleeve Panel Slit & Cuff Join Mark
↓
Sleeve Panel Join
↓
Sleeve Panel Top Stich

Collar & Band Part



Assemble





CHAPTER-3
EXPERIMENTAL DETAILS

3.1 Non productive time(NPT) of Side welt Chino shorts(Line-207)

3.1.1 Product details of Side welt chino shorts:

Buyer name: WILLIAM DICKIES

Product name: Side welt chino shorts

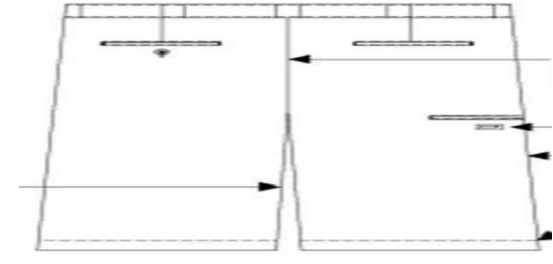
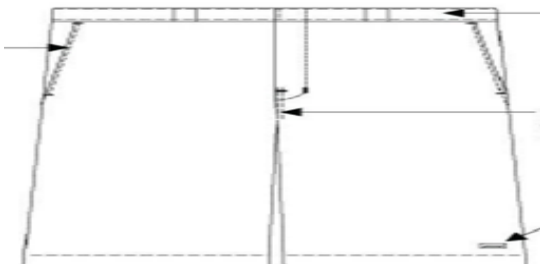
Style no: WR640

Order Quantity: 43408

Fabric details: Twill fabric,100% cotton.

SMV(standard minute value) for making of this product: 20.34 minute

Figure 3.1.1.1 Complete front and Back picture of Side welt chino pant



3.1.2 Details about sewing Line 207:

NO OF M/C	49
TTL MANPOWER	56
LINE TGT/Hr. (As incentive TGT)	115(With 70% efficiency)
WORK HOUR	10
LINE TGT/DAY. (As incentive TGT)	1152

3.1.3 Seven day Non-productive time of Side welt chino shorts

Table 3.1.3.1 1st day non-productive time of Side welt chino shorts

Total manpower=56

working hour=10

Date:1/3/21

DAY	Cause name	TIME START	TIME END	NPT IN MIN	AFFECTED WORKER	TOTAL NPT IN MIN	PRODUCTION (TARGET-1152 pcs)	EFFICIENCY
1	Input delay	9.00	10.00	60 min	4	240	800 Pcs	69.44%
	Machine breakdown	12.30	12.50	20 min	1	20		

Details of Causes:

Input delay: Garments cut parts weren't arrived on time in the sewing line from the cutting section. For this reason 4 workers sat idle in that time which leads to produce non-productive time.

M/C breakdown: A plain lock stitch m/c stop working due to not raising feed teeth. For this, fabric wasn't moving in forward direction.

Table 3.1.3.2 2nd day non-productive time of Side welt chino shorts

Total manpower=56

working hour=10

Date:2/3/21

DAY	Cause name	TIME START	TIME END	NPT IN MIN	AFFECTED WORKER	NPT IN MIN	PRODUCTION (TARGET-1152 pcs)	EFFICIENCY
2	Rework	8.30 9.40 3.25	8.40 9.55 3.30	10 min 15min 5min	3 6 2	30 90 10	800	69.44%
	Machine breakdown	2.00	2.30	30 min	3	90		

Details of Causes:

Rework: In the Quality checking table, Broken stitch, skip stitch and tension loose problem found in side welt chino pant which leads to rework on them.

M/C breakdown: A problem(thread keeps breaking) occurs on Kansai machine which is the reason for m/c breakdown.

Table 3.1.3.3 3rd day non-productive time of Side welt chino shorts

Total manpower=56

working hour=10

Date:3/3/21

DAY	Cause name	TIME START	TIME END	NPT IN MIN	AFFECTED WORKER	NPT IN MIN	PRODUCTION (TARGET-1152 pcs)	EFFICIENCY
2	Supervision problem	11.00	11.20	20 min	3	60	840	73%
	Machine breakdown	12.00	12.15	15 min	3	45		

Details of causes:

Supervision problem: Due to not giving proper guidelines to the operators ,some operators suffer badly for not understanding what they have to do. For this reason they sat idle for a short period of time.

M/C breakdown: A Double needle lockstitch machine stops working for some mechanical issue.

Table 3.1.3.4 4th day non-productive time of Side welt chino shorts

Total manpower=56

working hour=10

Date:4/3/21

DAY	Cause name	TIME START	TIME END	NPT IN MIN	AFFECTED WORKER	NPT IN MIN	PRODUCTION (TARGET-1152 pcs)	EFFICIENCY
4	Rework	10.30 11.05 3.00 3.40	10.40 11.10 3.15 3.46	10 min 5min 15min 6 min	2 1 3 3	20 5 45 18	800	69.44%
	Quality checking delay	2.30	2.45	15 min	3	45		

Details of causes:

Rework: High low, skip stitch, broken stitch found in garments which leads them to rework.

Quality checking delay: Quality inspector was absent for a short period of time. For this, some operators couldn't continue their work due to not receiving the checked garments.

Table 3.1.3.5 5th day non-productive time of Side welt chino shorts

Total manpower=56

working hour=10

Date:6/3/21

DAY	Cause name	TIME START	TIME END	NPT IN MIN	AFFECTED WORKER	NPT IN MIN	PRODUCTION (TARGET-1152 pcs)	EFFICIENCY
5	Machine breakdown	3.00	3.40	40 min	3	120	800	69.44%

Details of causes:

Machine breakdown: Overlock machine stop working due to loss connection with power supply for internal problem of m/c.

Table 3.1.3.6 6th day non-productive time of Side welt chino shorts

Total manpower=56

working hour=10

Date:7/3/21

DAY	Cause name	TIME START	TIME END	NPT IN MIN	AFFECTED WORKER	NPT IN MIN	PRODUCTION (TARGET-1152 pcs)	EFFICIENCY
6	No input	8.30	9.10	40 min	5	200	800	69.44%
	Rework	10.00 11.25 2.30	10.07 11.32 2.40	7 min 7 10	2 1 2	14 7 20		

Details of causes:

No input: Garments cut parts weren't arrived on time in the sewing line from the cutting section. For this reason 4 workers sat idle in that time which leads to produce non-productive time.

Rework: In the Quality checking table, Uneven stitch,skipped stitch and missing stitch problem found in side welt chino pant which leads to rework on them.

Table 3.1.3.7 7th day non-productive time of Side welt chino shorts

Total manpower=56

working hour=10

Date:8/3/21

DAY	Cause name	TIME START	TIME END	NPT IN MIN	AFFECTED WORKER	NPT IN MIN	PRODUCTION (TARGET-1152 pcs)	EFFICIENCY
7	Meeting/giving instructions	11.20	11.50	30 min	7	210	800	69.44%
	Rework	10.20 11.13 3.05	10.24 11.20 3.12	4 min 7 min 7min	3 1 2	12 7 14		

Details of causes:

Meeting/ giving instructions: A fault was formed in back part of side welt chino pant continuously .So a meeting was arranged to give proper instructions of solution about that.

Rework: In the Quality checking table, seam puckering,skipped stitch and broken stitch problem found in side welt chino pant which leads to rework on them.

3.2 Non productive time(NPT) of Jacket(Line-198)

3.2.1 Product details of Jacket:

Buyer Name: VF Asia

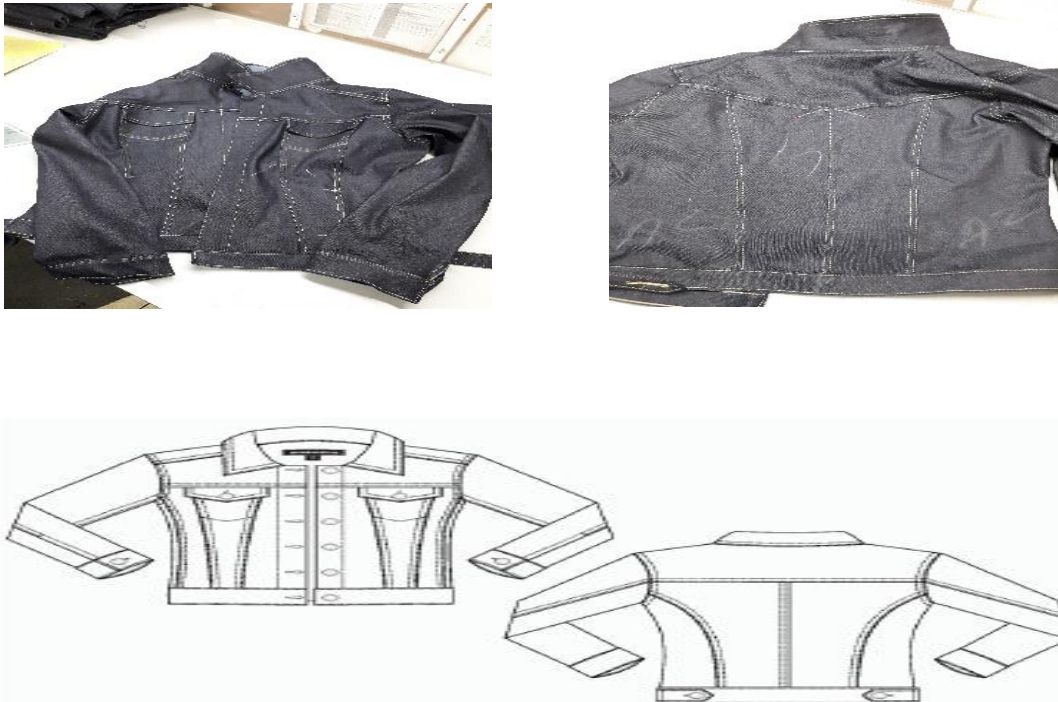
Product Name: Jacket

Style No: RAF 1473

Order Quantity: 31000

SMV: 30.66

Figure 3.2.1.1 Complete front and back picture of jacket



3.2.2 Details about Sewing Line 197:

No of Machines	55
Total Manpower	71
Line Target/Hr. (As Incentive Target)	83 (with 60% Efficiency)
Work Hour	08
Line Target/Day. (As Incentive Target)	667

3.2.3 Seven day Non-productive time of jacket

Table 3.2.3.1 1st day non-productive time of Jacket

Total manpower=71

working hour=08

Date:8/2/21

DAY	Cause name	TIME START	TIME END	NPT IN MIN	AFFECTED WORKER	TOTAL NPT IN MIN	PRODUCTION (TARGET-667 pcs)	EFFICIENCY
1	Supervision Delay	09.00	09.25	25 min	5	125	600 Pcs	89.96%
	Machine breakdown	03.10	03.45	35 min	1	35		

Details of Causes:

Supervision problem: Sometimes operators did not get proper guidelines, that's why some of them do not understand what to do. So they sat idle for a short period of time.

Machine Breakdown: A Feed of the Arm machine sometimes stop during working for some mechanical issues.

Table 3.2.3.2 2nd Day Non-Productive Time of Jacket

Total manpower=71

working hour=08

Date:9/2/21

DAY	Cause name	TIME START	TIME END	NPT IN MIN	AFFECTED WORKER	TOTAL NPT IN MIN	PRODUCTION (TARGET-667 pcs)	EFFICIENCY
2	Re-Work	10.15	10.25	10 min	3	30	600 Pcs	89.96%
		02.30	02.50	20 min	2	40		
	Quality Checking Delay	04.00	04.25	25 min	2	50		

Details of Causes:

Rework: Sometimes broken stich, skip stich etc problems found in the time of quality checking. In the quality checking table the quality inspector identifies them & sent back again for reworking.

Quality checking delay: Sometimes Quality inspector remain absent for a short period of time. For this, some operators couldn't continue their work. Because they did not get checked garments.

Table 3.2.3.3 3rd Day Non-Productive Time of Jacket

Total manpower=71

working hour=08

Date:10/2/21

DAY	Cause name	TIME START	TIME END	NPT IN MIN	AFFECTED WORKER	TOTAL NPT IN MIN	PRODUCTION (TARGET-667 pcs)	EFFICIENCY
3	Cutting Delay	9.00	10.00	60 min	4	240	600 Pcs	89.96%
	Supervision Problem	11.00	11.15	15 min	4	60		

Details of causes:

Cutting Delay: Cutting delay may occurred for waiting for the next lay or may be waiting for marker. Due to low cutting capacity, sewing cannot get proper input.

Supervision problem: Sometimes operators did not get proper guidelines, that's why some of them do not understand what to do. So they sat idle for a short period of time.

Table 3.2.3.4 4th Day Non-Productive Time of Jacket

Total manpower=71

working hour=08

Date:11/2/21

DAY	Cause name	TIME START	TIME END	NPT IN MIN	AFFECTED WORKER	TOTAL NPT IN MIN	PRODUCTION (TARGET-1152 pcs)	EFFICIENCY
4	Accessories delay	9.20	10.15	55 min	3	165	600 Pcs	89.96%

Details of causes:

Accessories Delay: Sometimes the accessories arrive late in the sewing section. Due to lack of accessories the operators cannot continue & have to stop their work.

Table 3.2.3.5 5th Day Non-Productive Time of Jacket

Total manpower=71

working hour=08

Date:12/2/21

DAY	Cause name	TIME START	TIME END	NPT IN MIN	AFFECTED WORKER	TOTAL NPT IN MIN	PRODUCTION (TARGET-667 pcs)	EFFICIENCY
5	Quality Checking Delay	10.00	10.20	20 min	4	80	600 Pcs	89.96%
	Machine breakdown	12.10	12.40	30 min	1	30		

Details of causes:

Quality checking delay: Sometimes Quality inspector remain absent for a short period of time. For this, some operators couldn't continue their work. Because they did not get checked garments.

Machine Breakdown: A Kansai machine sometimes stop during working for some mechanical issues.

Table 3.2.3.6 6th Day Non-Productive Time of Jacket

Total manpower=71

working hour=08

Date:13/2/21

DAY	Cause name	TIME START	TIME END	NPT IN MIN	AFFECTED WORKER	NPT IN MIN	PRODUCTION (TARGET-667 pcs)	EFFICIENCY
6	Cutting Delay	9.30	10.20	50 min	4	200	600 Pcs	89.96%

Details of causes:

Cutting delay: Cutting delay may occurred for waiting for the next lay or may be waiting for marker. Due to low cutting capacity, sewing cannot get proper input.

Table 3.2.3.7 7th Day Non-Productive Time of Jacket

Total manpower=71

working hour=08

Date:14/2/21

DAY	Cause name	TIME START	TIME END	NPT IN MIN	AFFECTED WORKER		PRODUCTION (TARGET-667 pcs)	EFFICIENCY
1	Machine Breakdown	9.00	09.35	35 min	5	175	600 Pcs	89.96%
	Re-Work	12.00	12.15	15 min	2	30		
		03.45	04.05	20 min	3	60		

Details of causes:

Machine Breakdown: A Overlock machine sometimes stop during working for some mechanical issues.

Rework: Sometimes broken stich, skip stich etc problems found in the time of quality checking. In the quality checking table the quality inspector identifies them & sent back again for reworking.

CHAPTER 4

SUMMARY

4.1 Non-productive time(NPT) summary of Side welt chino pant and Jacket

Table 4.1.1 One week Non-productive time(NPT) summary of Side welt chino pant

Date	Causes	NPT(min)
1	Input delay	240
	Machine breakdown	20
2	Rework	130
	Machine breakdown	90
3	Supervision problem	60
	Machine breakdown	45
4	Rework	88
	Quality checking delay	45
5	Machine breakdown	120
6	No input	200
	Rework	41
7	Meeting/Giving instructions	210
	Rework	33

Graph 4.1.1 One week Non-productive time(NPT) summary of Side welt chino pant

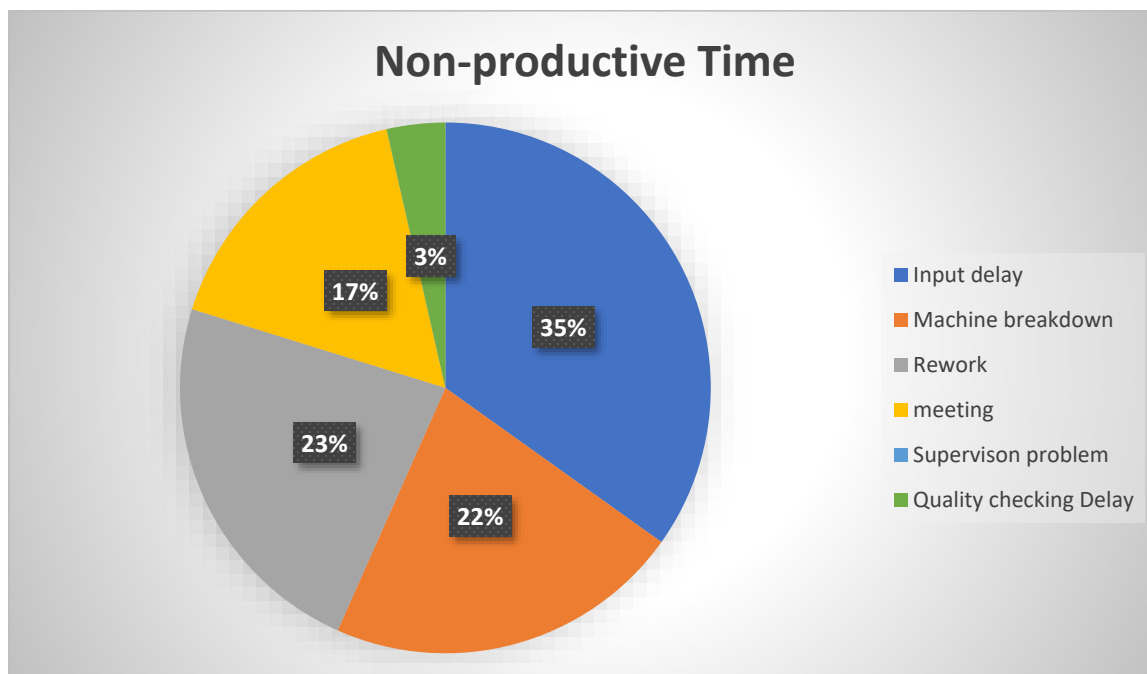
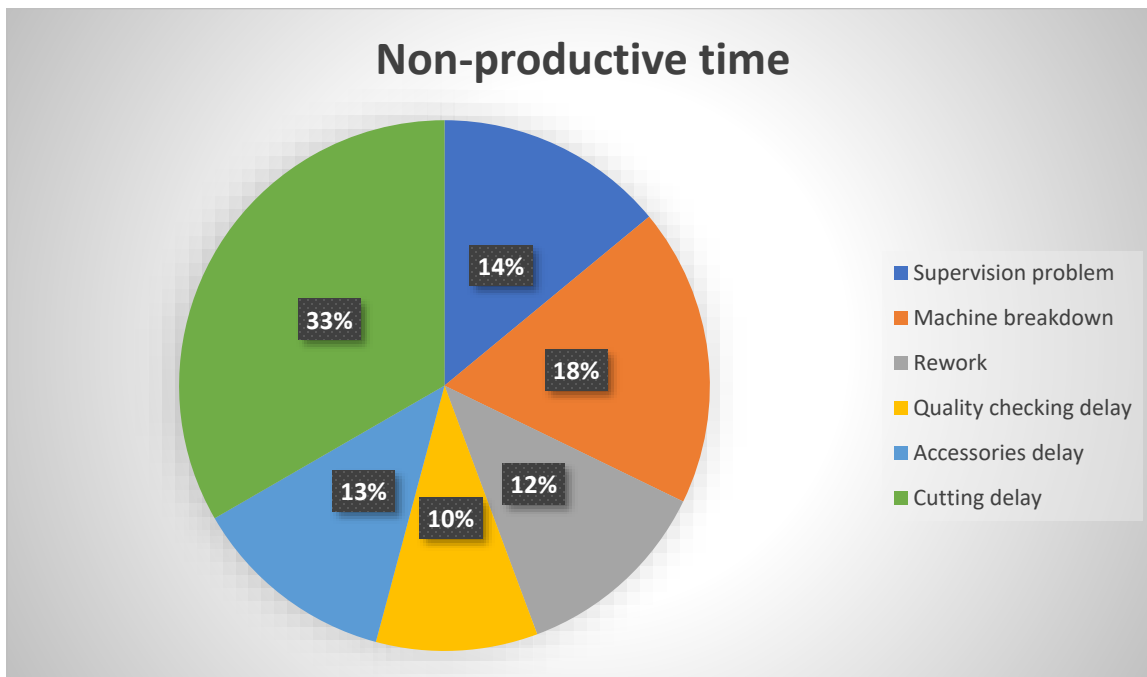


Table 4.1.2 One week Non-productive time(NPT) summary of jacket

Date	Causes	NPT(min)
1	Supervision Problem	125
	Machine breakdown	35
2	Rework	70
	Quality Checking Delay	50
3	Cutting delay	240
	Supervision problem	60
4	Accessories Delay	165
5	Quality Checking Delay	80
	Machine Breakdown	30
6	Cutting Delay	200
7	Machine Breakdown	175
	Rework	90

Graph 4.1.2 One week Non-productive time(NPT) summary of Jacket



4.2 Comparison between Side welt chino pant and Jacket

Table 4.2.1 Comparison between Side welt chino pant and Jacket

Buyer name: WILLIAM DICKIES Product name: Side welt chino shorts		Buyer Name: VF Asia Product Name: Jacket	
Problem name	Total min	Problem name	Total min
Input delay	440	Supervision problem	185
Machine breakdown	275	m/c breakdown	240
Rework	292	Rework	160
Supervision problem	60	Quality checking delay	130
Meeting	210	Accessories delay	165
Quality checking Delay	45	Cutting delay	440
Total	1324	Total	1320

This table shows the comparison of Non-productive time of two different product. One is side welt chino shorts and other is Jacket. The production process of these two product are different. Between these two Jacket requires more machines, manpower and time to produce one.

4.3 Major Reasons for NPT and its solution

Supervision problem:

Solution:

1. Need to give proper training .
2. Need to develop good communication with worker.
3. Must have to contain leadership skills.
4. Always have to aware of daily production target.

Rework:

Solution:

1. At first workers should be divide into Good, medium, low category. Then they must be appointed in critical, semi-critical and basic section. As a result less faults will be happen during sewing which leads to less rework.
2. Every operation must be done very carefully.

Style change delay:

Solution:

1. Must have to preplanned on each style changing.
2. Have to collect all the materials before go for production of that style.
3. Proper line balancing and machine setup must have to done very quickly so that non productive time cannot be produced.

Machine breakdown:

Solution:

1. Maintenance team must have check all the machine after a certain period of time.
2. Have to setup proper rpm according to the capacity of different machine for avoiding machine breakdown.
3. A common problem for machine breakdown is needle broken. It can be avoid by using lubricating oil or by proper utilization of needle size.

Cutting delay:

Solution:

Must have to get fabric cutting approval in time, If this can done, then workers will not sit idle during production time.

Accessories delay:

Solution:

Accessories should available when it required.

Must have to complete before arriving of cut parts to the sewing section.

CHAPTER 5

CONCLUSION

5.1 Conclusion:

Firstly we tried to find out one week Non-Productive Time of short pant and jacket. We took data from two different lines. We tried to show the comparison of Non-Productive Time of short pant and jacket. We also discussed what will be the solution for this problem.

Finally if we can able to understand the ways of reducing NPT which can help to minimize the cost of production.

Side welt chino pant

- Input delay 440 min
- Machine breakdown 275 min
- Rework 292 min
- Supervision problem 60 min
- Meeting 210 min
- Quality checking Delay 45min

In sewing line 207, Highest non-productive time consumed by Input delay.

Jacket

- Supervision problem 185 min
- m/c breakdown 240 min
- Rework 160 min
- Quality checking delay 130 min
- Accessories delay 165 min
- Cutting delay 440 min

In sewing line 197, Highest non-productive time consumed by cutting delay..

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