"Effective way to Estimate SMV for seven pocket cargo pant Manufacturing"

A dissertation submitted to the Sonargaon University in partial fulfillment of the requirements for the degree of Bachelor of Science in Textile Engineering

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Course Title: Project Work Sessional
Course Code:Tex-441

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DECLARATION

We herewith declare that we've completed the present thesis entitled **"Effective way to Estimate SMV for seven pocket cargo pant Manufacturing"** by us and without the use of any aids other than those listed. All passages that were taken either directly or mutatis mutandis from published and unpublished sources have been marked as such. The thesis has never been submitted to a different examination authority for any other degree in the same or a similar form.

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DECLARATION CERTIFICATE

This is certified that the thesis entitled **"Effective way to Estimate SMV for seven pocket cargo pant Manufacturing**"is an experimental research work carried out by **Md.SumonBhuyan, Md. Harun-or-Rashid**,**Mohammad Faisal Faruk**,**Md. Shahabuddin**under our supervision, and that they have fulfilled the conditions laid down in the Sonargaon University ordinances. The submitted dissertation may be considered for awarding the B.Sc. in Textile Engineering degree.

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We also like to thank all the staff and workers who helped us by providing respective information, valuable time and great support during the assessment for our thesis work.

In addition, thanks are due to those who helped me directly and indirectly during the different stages of the Thesis.

ABSTRACT

A cargo pant thigh holster System, enclosed within the Side pocket of the cargo pants to provide vertical ins of the inner lining of the Side pocket of the cargo pants
9 to secure the holster against rotated movement. A reinforced
Seam System of Said cargo pants that begins with a rein a belt line also of reinforced Stitching that connects the vertical double button assembly in the front of the pants
Publication Classification above the Zipper. Said cargo pants are comprised of two
front pockets, two rear pockets and two side (thigh) pockets

CONTENT

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CHAPTER ONE
INTRODUCTION

The History of Cargo Pants:
Although cargo pants were a major fashion trend in the 1990s, the history of these pants is purely functional. First worn by soldiers as early as the 1930s, cargo pants provided storage and easy access to gear. Cargo pants still are worn for functional and fashion purposes.

Characteristics:
The traditional cargo pant is a utilitarian pair of khaki pants, differentiated from regular pants by its cargo pockets. Cargo pockets are large square-shaped patch pockets located on the side of each pant leg, usually at the lower thigh. These are in addition to the standard front pockets. Cargo pockets usually fold shut and secure with a snap or Velcro, and are pleated to expand to accommodate storage of larger items.

Origin:
Cargo pants were first worn in 1938 by British military personnel. These cargo pants were part of their Battle Dress Uniforms (BDUs). The original cargo pants style featured one pocket on the side thigh and one on the front hip. Cargo pants were first worn in the United States on military uniforms in the 1940s. The side cargo pockets initially were only on paratroopers' uniforms, providing them with easy access to ammunition and radios.

Fashion History:
Cargo pants surged onto the fashion scene in the mid-to-late 1990s. Following a "trickle up" theory of how fashions spread, cargo pants first were worn as fashion by urban hip-hop performers in the 1990s. This trend flowed up to the mass market; cargo pants were ubiquitous at almost any men's or women's clothing retailer at this time. Although the cargo pockets on most items were functional, they often were unused and just worn as decorative details.

Variations:

For women, Cargo pants are offered in a variety of softer fabrics and colors, sometimes with ribbon trim or embellishments. U.S. fashion designer Ralph Lauren presented silk cargo pants as part of his runway show in 1998. In addition to pants, the cargo pocket has appeared on jeans, skirts, shorts and Capri pants. Cargo pockets have been added to shirt sleeves as well, usually located between the shoulder and elbow.

Today:
Although cargo pants are not as trendy as they were in the 1990s, cargo pockets still are used as a functional detail on men's clothing. Men's and women's military uniforms, police uniforms, EMS uniforms and medical scrubs are available with cargo pockets on the pants.

The Aim and Objectives of Present Work:

The main goal of this thesis work is to present an overview of the present SMV for seven pocket cargos pant Manufacturing.

The objectives are as follows:

- To showcase the present situation of waste management in Cargo Pants

Outline of this thesis:

Introduction,

- General discussion Objective of thesis

Experimental Details,

- SMV for seven pocket cargo pant.
- Measurement Chart& Sketch.

Data Analysis,

- Operation Bulletin and SMV of a Cargo Pant
- Exposing the risks of sampling, inspection and analysis

CHAPTER TWO
LITERATURE REVIEW

Cargo Pants Definition for the Clothing Industry:

Cargo pants or cargo trousers, also sometimes called combat trousers (or combats) after their original military purpose, are loosely cut pants designed for tough, outdoor activities distinguished by one or more cargo pockets. A cargo pocket is a form of a patch pocket, often with accordion folds for increased capacity closed with a flap secured by snap, button, or Velcro common on battledress and hunting clothing. Variously, cargo pockets may be hidden within the legs. Cargo pants are made of hard wearing fabric and ruggedly stitched. Increasingly they are made of quick-drying synthetic or cotton-synthetic blends, and often feature oversized belt loops to accommodate wide webbing belts. The garments are characteristically designed to allow bending at the knee and hip and sewn with felled seams. Cargo pants were first worn by members of the British Armed Forces in 1938, and were introduced to the United States in the mid-1940s during World War II. The large pockets characteristic of cargo pants were originally designed to allow paratroopers more room to hold radios and extra ammunition. Cargo shorts are cargo pants shortened at the knee. Some cargo pants are made with removable lower legs allowing conversion into shorts. EMT pants are cargo pants which have 6-way cargo/scissor pockets on one or both legs each with a hidden zippered pocket on top of cargo pocket, a bellowed flap pocket with increased carrying capacity, Besom pockets on calves for glove storage, and 3 slots for scissors (2 two fitted with snap closures).

Key Moments in the Contentious History of Cargo Shorts:

When Zach Galifianak is hosted Saturday Night Live back in 2011, he did an impression during his monologue called “Guy from Queens who’s obsessed with cargo shorts.” The whole bit was one line (not counting the setup), in which Galifianak is said, in a thick Queens accent, “What are those, cargo shorts?” Only Galifianakis could properly sell a joke like that, but it hinted at where cargo shorts were headed in the eyes of our cultural zeitgeist. Today, cargo shorts are so widely loathed that they serve as their own punch line — yet they can still be found everywhere, from clothing store racks to big-box retailers to online shopping sites. They accounted for more than $700 million in sales back in ye’ older days of 2016, and that’s after their first dip in sales in more than a decade. Not bad for some shorts that cost between $20-$30 a pair. Still, ubiquitous as they are (and have been), you’ll be hard-pressed to find another article of clothing for which the simple utterance of its name can create divisive rancor, ruining dinner parties and turning friendships sour. In the “garments that can start arguments” category, “the dress” has nothing on a pair of “cargos.” To try to fathom how we arrived at this contentious place, here’s a look at some key moments in the history of the reviled garment.

1940s

GETTY IMAGE:
Before they became a running gag, cargo pants were first worn by members of the British infantry in 1938 and were introduced to American soldiers in the early 1940s, by the time the US entered WW2. The large pockets were modified slightly for the US Paratrooper division, used for storing maps,

rations, and extra ammunition. They were kept in use by the military, later made with larger pockets as the troops were required to wear more and more gear.

Then came the inevitable trickle-down effect. Veterans brought these cargo pants home with them, and they circulated into street fashion by subcultures fond of shopping at military surplus stores.

1980s

ISTOCK PHOTO:

This was the decade that cargo shorts really came into their own. Keeping the utility of the oversized pocket, but doing away with any fabric below the knee, they were marketed to aspiring outdoorsy types and at-home handymen. While they could be seen on golf courses and on hiking trails, they were years away from becoming a widely derided fashion staple.

Still, if you look back on the 80s, the rise of khaki shorts, in general, hinted at what was to come.

MCCALLS:

1990s

ISTOCK/SHUTTERSTOCK:

By the 90s, the shorts that evolved from utilitarian necessity had become unequivocally associated with lazy weekend wear. The pockets seemed to go empty and unused, but their shapeless simplicity drew the largely male demographic to them in droves. Manufacturers like Gap, American Eagle, Old Navy, and Abercrombie & Fitch all got in on the action, and the 20th century came to a close with cargo shorts dominating high schools, college campuses, weekend getaways, and backyard gatherings the nation over. This was the clear pre-mocking peak: 1995-2001. The bro uniform du jour. Add some flip-flops and a button up and you were covered for summer.

THE APATOW COMPANY:

2000s

ISTOCK/SHUTTERSTOCK:

With a new millennium came a slimmer look to men's fashion overall. While the unwept baggy look that defined the grunge-era was being swapped out for more form-fitting wear, cargo shorts seemed to linger. Even if they ended up stuffed away and out-of-sight in some drawer near the bottom of the dresser, the appeal of cargo shorts held on strong enough for the garment to maintain its popularity deep into the next decade.

This was also when having a cell phone would start to become the norm, which validated the existence of its oversized pockets. That might've given cargo shorts a newfound foothold, but much of their longevity is attributed to the idea that late Gen-Xara and early Millennial who wore them when they were in high fashion grew up and never got rid of them.

Joseph Hancock, who literally wrote his PhD about cargo pants in 2007, believed that these 90s-era teens didn't evolve — at least where their wardrobe was concerned.

2010s

ISTOCK/ SHUTTER STOCK:

It was around 2015 or so when the increasingly heated conversation about cargo shorts took the spotlight. It started with an article in Wall Street Journal — focused on wives suffering in the presence of their husbands' cargo shorts. The story went viral, and every other major news outlet from The New York Times to The Washington Post followed suit to weigh in on the fierce debate. It created a bit of media frenzy, and while there were a few passionate defenses, most seemed thrilled to see the end days approaching. Everyone had an opinion on the matter, and it seemed like everyone was going out of their way to express it. Seriously, even Netflix weighed in.

Today

SHUTTER STOCK:

The national conversation still continues, sometimes with an (arguably noble) intent to steer those loyal stalwarts of the one-time fashion staple toward a sleeker alternative, like chino shorts. But there's still no shortage of buying options when it comes to cargo shorts, indicating there will always be some undying loyal factions that will hold out, despite the risk of them being deemed fashion pariahs.

Unlike the fanny pack, which make cameo appearances in candid celebrity photos and occasional Integral posts, there are no real defenders of cargo shorts. Even Matthew McCaughey, who's known to don a pair from time to time, still readily brings up their drawbacks when Craig Ferguson asked about them.

Nonetheless, it seems like cargo shorts are going to continue to be a staple on clothes racks for the time being. How long that lasts depends on whether or not the garment's staunchest defenders are passing their beloved tradition to a younger generation.

CHAPTER THREE
THEORETICAL BACKGROUND

What is Cargo Pant?

Cargo pants are characterized by cargo pockets. These are large pockets on the upper legs of the pants. They're placed on the outer thighs, above the knees. Cargo pockets are typically made to be expandable, so they get bigger as more items are put inside them, and have flap closures. The flaps may be secured with Velcro, buttons, even magnets sewn into the cloth.The large cargo pockets are rarely the only pockets in cargo pant styles. Usually, cargo pants have a minimum of six pockets. That includes standard back pockets and hip pockets that are found in many pant styles. Standard cargo pant designs are made to be somewhat loose-fitting and comfortable. Traditional cargo pants are made in khaki or camouflage designs, an homage to their military roots. However, cargo pants have evolved and changed a great deal since those early military days.

Who Wears Cargo Pant?

Because they are great for storage, cargo pants are still used in uniforms and they're still worn widely by professionals who need to keep items readily available. Cargo pant styles are also still worn by military personnel and police officers. You'll see them being worn by first responders and many other working professionals. They're popular with construction workers, plumbers, electricians, and others who work with their hands.

However, cargo pants can be worn by anyone and often are. This is a popular look and it's practical whether you're working or just having a day of relaxation. After all, everyone's got things to carry. Should always be preferred over micromanagement.

Types of Cargo Pants:

Pants that have cargo pockets are cargo pants. However, there are many different designs and different types of cargo pants.EMT pants are cargo pants that are specifically designed for first responders. These pants are usually made with a blend of polyester and cotton fabrics that creates a durable material that's easy to machine wash. Often, these pants are reinforced in heavy-wear areas like the knees. EMT cargo pants are made with lots of pockets. The big pockets often have dividers to make it easy to store medical supplies. EMT cargo pants are often made in dark blues, grays, and blacks, common uniform colors.

Tactical cargo pant sare worn by SWAT team members and other police officers. Tactical cargo pants are made to be exceptionally durable. These cargo pants are made with concealed pockets, smaller pockets that are hidden inside the large cargo pockets. Tactical pants are usually reinforced and made with double stitching techniques to make them wear-resistant. Tactical cargo pants are frequently made in shades of gray, black, green, khaki, and blue.

Hiking cargo pantsare made to withstand the elements and provide lots of pocket space. Made for toughness, water-resistance, and storage capacity, hiking cargo pants are designed for outdoor enthusiasts of all kinds. These pants are perfect for fishing, camping, and any sort of outdoor leisure. You can often find hiking cargo pants in camouflage patterns and other natural Earth colors, like brown and khaki.

Slim fit cargo pantsare one of the newer types of cargo pants out there. This design is different from traditional cargo pant styles because it's made to be form-fitting, rather than loose. Otherwise, slim fit cargo pants are like any other type of cargo pants, with plenty of pocket space and durable fabric.

Cargo jogger pantsare designed as athletic wear that has the traditional cargo pant style. These cargo pants are generally made in soft, breathable cloth with a drawstring or elastic waistbands that are contouring and comfortable. These cargo pants still have the leg pockets but unlike traditional cargo pant styles, they're made to be lightweight and they aren't designed with heavy fabric types.

High-end cargo pantsare now totally a thing, too. Now, cargo pants are made from a huge variety of materials, from silk to leather, and made in straight-leg, flare, and skinny styles. High-end fashion designers have offered their own expensive versions of cargo pants that have been worn by celebrities all across the entertainment industry. High-end cargo pants are made in a dizzying array of colors and patterns.

Denim cargo pantsare another relatively new development when it comes to cargo pant styles. Cargo pant styles have now made the leap to denim to become a legitimate blue jeans style. Denim cargo pants have the classic big leg pockets and typically, several more pockets everywhere to emphasize the cargo pant design

Wearing Cargo Pants:

Cargo pants are highly adaptable and the design can be made in any fabric. Tactical and camping cargo pants are often made with cotton rip stop material. This is a fabric that is designed to prevent tears. The fabric is woven so that tears literally stop. Hence, rip stop. Cargo pants can be worn in any season. Some styles are made to be heavier and more insulating for colder temperatures, while others are made to be lightweight and breathable for hot weather. Cargo pants can be worn with almost anything, but it's common to pair these pants with casual shirts, like T-shirts, and casual shoes like boots and sneakers. You don't need a battlefield to have a need for cargo pants anymore. These pants have made it into every aspect of fashion. They can be worn as rugged outdoor wear, as part of a work uniform, as a casual style choice, or even as something totally expensive and high-end. Cargo pants can be worn by anyone, even the ultra A-list celebs, and they can look good on anyone. Find the type of cargo pants you like best and start putting things in those super useful pockets. Because after all, storing items is what cargo pants are all about.

MEASUREMENT CHART: Style A+B:

Size		**46**	**48**	**50**	**52**	**54**	**56**	**58**
WB	waistband height	4	4	4	4	4	4	4
Y1	back yoke height at C.b.	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Y2	back yoke height at side seam	4	4	4	4	4	4	4
	belt loop, width	2	2	2	2	2	2	2
	belt loop, length	5.5	5.5	5.5	5.5	5.5	5.5	5.5
K	½ waist	37.5	39	41.5	44	46.5	48.5	51
	zipper length	16	16	16	17	17	18	18
	front fly length/width excl. WB	18	18	18	19	19	20	20
C1	pos. of seat meas. excl. WB at side	20	20	20	20	20	21	22
C1	pos. of seat meas. excl. WB at c.f.	19	19	19	19	19	20	21

C	½ seat	53.5	54.5	56	57.5	59	60.5	62
FR	front rise excl. WB	23	24	25	26	27	28	29
BR	back rise excl. WB	35.7	37	38.3	39.6	40.9	42.4	43.9
T	½ thigh	32.5	33.5	34.5	35.5	36.5	37.5	38.5
M	½ leg opening	26.5	27	27.5	28	28.5	29	29.5
M2	hem height	2.5	2.5	2.5	2.5	2.5	2.5	2.5
E	inner seam	29.5	30	30.5	31	31.5	32	32.5
B	outer seam excl. WB	50.2	52	53.5	55	56.5	58	59.5
Pm1	pocket mouth horizontal	10.5	11	11	11.5	11.5	12	12
Pm2	pocket mouth vertical	10.5	11	11	11.5	11.5	12	12

SKETCH:
Fitting: casual, normal rise, Bermuda, straight, added waistband, elastic at bac

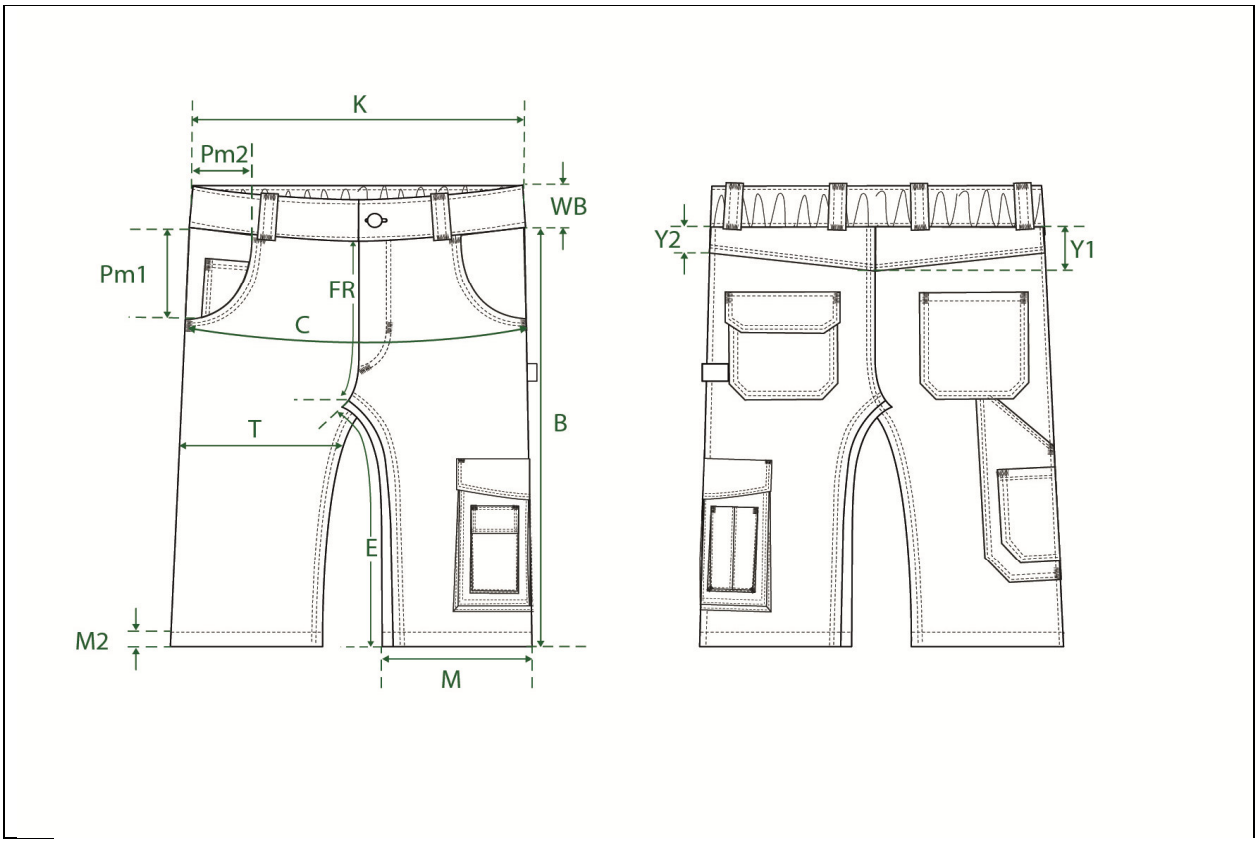


Fig 0.1: Seven Pocket Cargo Pant.

MEASUREMENT CHART: Style A+B – left tight pockets:

Size	46	48	50	52	54	56	58
flap pocket position excl. WB until upper edge of flap	24	25	26	27	28	29	30
1.flap pocket length excl. flap	22	22.5	22.5	23	23	23.5	23.5
2.flap pocket width	19.5	20	20	20.5	20.5	21	21
flap pocket pleat deepness	2	2	2	2	2	2	2
3.patched pocket width	6	6	6	6	6	6	6
5.patched pocket length	13	13	13	13	13	13	13
patched pocket pleat deepness	2	2	2	2	2	2	2
6.2nd flap pocket width	8	8	8	8	8	8	8
7.2nd flap pocket length incl. flap	15	15	15	15	15	15	15
2nd flap pocket pleat deepness	2	2	2	2	2	2	2
2nd flap width	8.5	8.5	8.5	8.5	8.5	8.5	8.5
8.2nd flap length	4	4	4	4	4	4	4
position of 2nd flap pocket & patched pocket from hem	0.7	0.7	0.7	0.7	0.7	0.7	0.7
9.flap height at mid	6	6	6	6	6	6	6
10.flap height at side	3	3	3	3	3	3	3
11.flap width	20	20.5	20.5	21	21	21.5	21.5

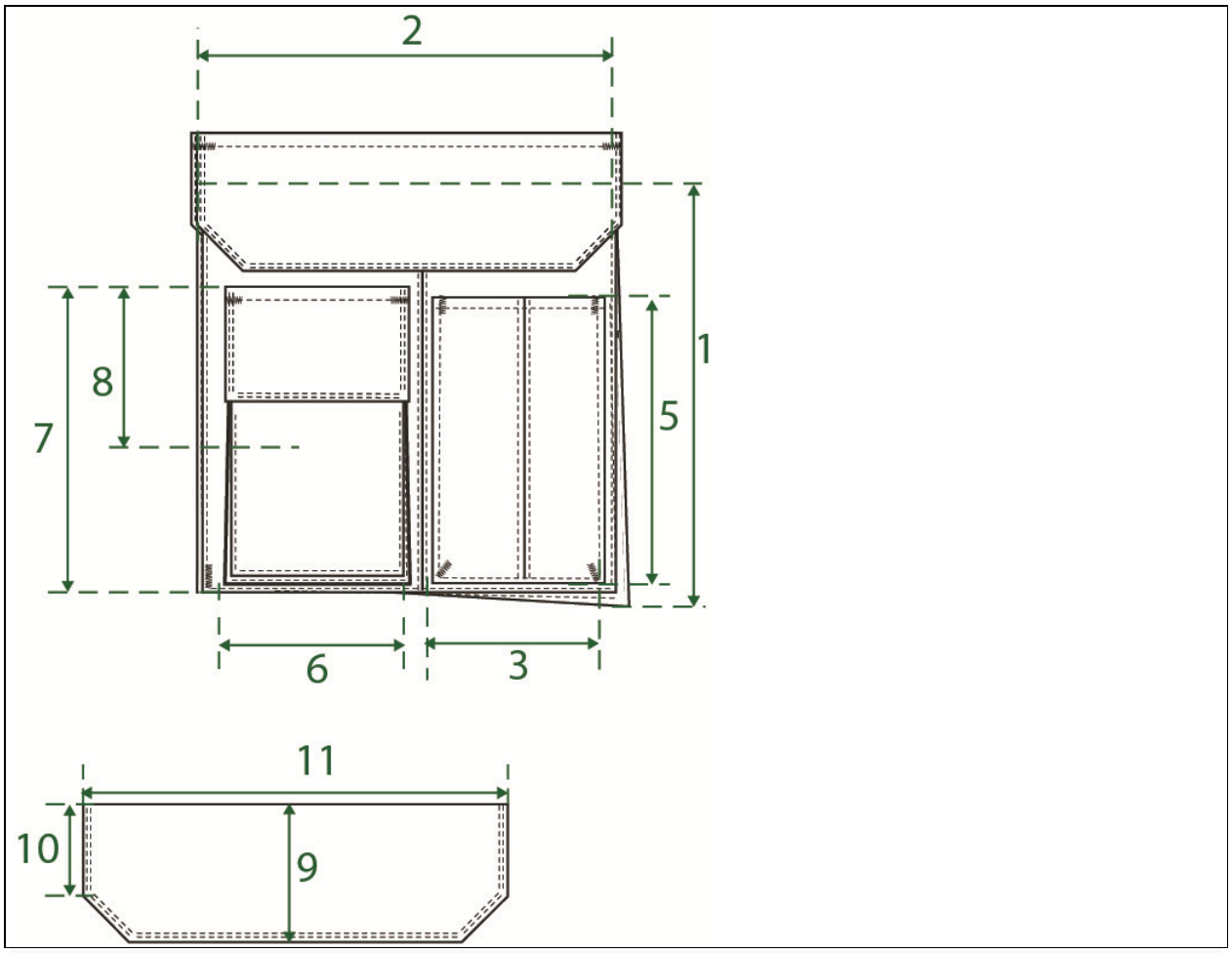


Fig: BackPocket

MEASUREMENT CHART: Style A+B – coin pocket + back pockets:

Size	**46**	**48**	**50**	**52**	**54**	**56**	**58**
right back pocket position below WB	7	7	7	7	7	7	7
left back pocket position below WB	5.5	5.5	5.5	5.5	5.5	5.5	5.5
1.total pocket length excl. flap	17	17.5	17.5	18	18	18.5	18.5
1.A total pocket length incl. flap	18.5	19	19	19.5	19.5	20	20
2.pocket length at side excl. flap	15	15.5	15.5	16	16	16.5	16.5
2. A pocket length at side incl. flap	16.5	17	17	17.5	17.5	18	18
3.complete pocket width	16	16.5	16.5	17	17	17.5	17.5
3.A flap width	16.5	17	17	17.5	17.5	18	18
4. pocket width at lower edge	12	12.5	12.5	13	13	13.5	13.5
5. flap length at mid	6	6	6	6	6	6	6
6. flap width at side	4	4	4	4	4	4	4
7. coin pocket width	10	10	10	10	10	10	10
8. coin pocket length	10.5	10.5	10.5	10.5	10.5	10.5	10.5

SKETCH:

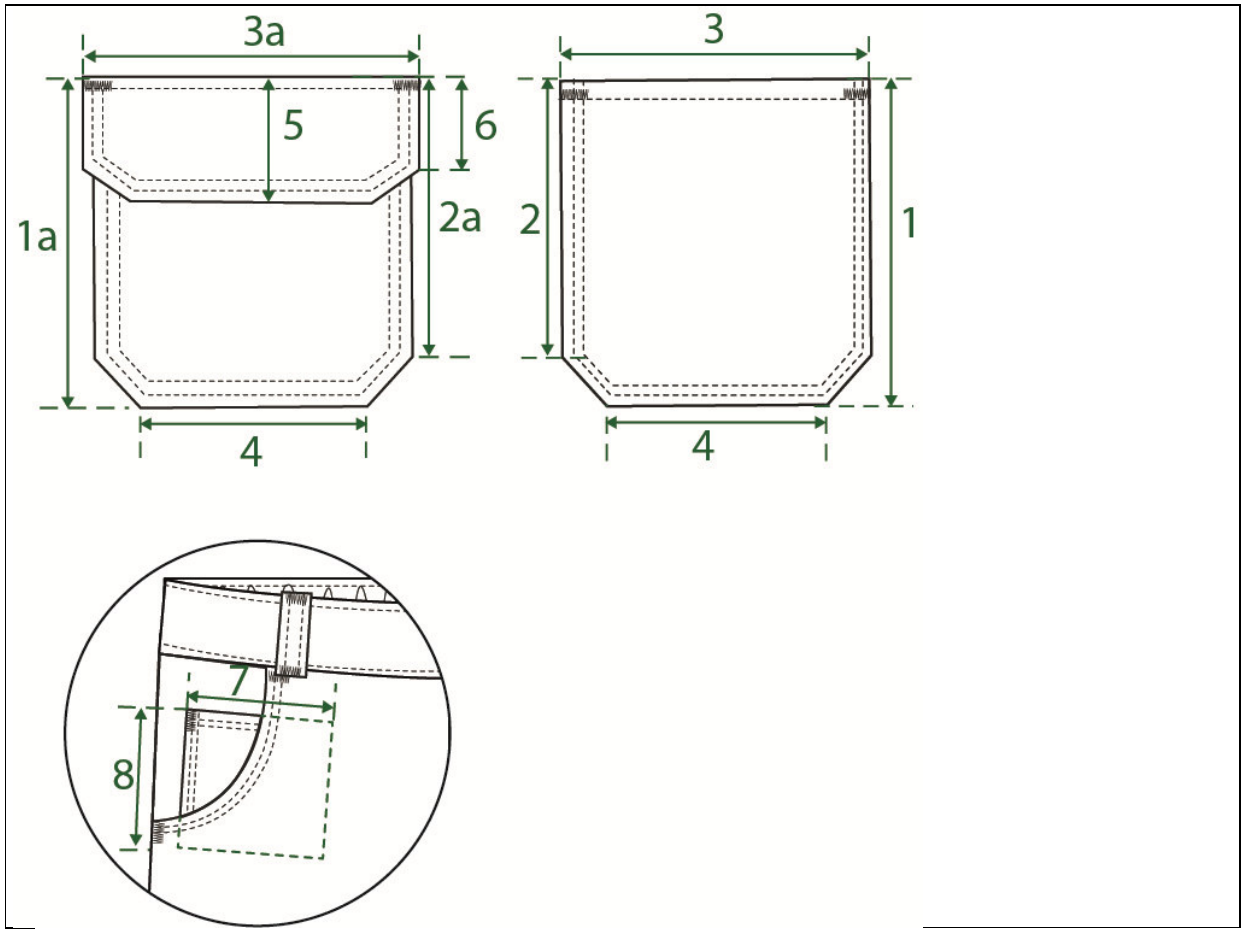


Fig:Frond Pocket

MEASUREMENT CHART: Style A+B – lower back pockets :

Size	**46**	**48**	**50**	**52**	**54**	**56**	**58**
1.Complete pocket length	21.5	22	22	22.5	22.5	23	23
2.Pocket length on left side	17.5	18	18	18.5	18.5	19	19
3.Complete pocket width	10	10	10	10	10	10	10
4.Lower pocket width	7	7	7	7	7	7	7
5.Upper pocket width	2	2	2	2	2	2	2
6.Pocket edge width diagonal	4.2	4.2	4.2	4.2	4.2	4.2	4.2
7.Pocket opening length	10	10	10	10	10	10	10
8.Distance to 2nd pocket at right side	2.5	2.5	2.5	2.5	2.5	2.5	2.5
9.2nd pocket complete length	11	11	11	11	11	11	11
10.2nd pocket length on left side	8	8	8	8	8	8	8
11. 2nd pocket width at upper edge / complete	7	7	7	7	7	7	7
12. 2nd pocket lower width	6	6	6	6	6	6	6
13. 2nd pocket edge width diagonal	2.7	2.7	2.7	2.7	2.7	2.7	2.7

SKETCH:

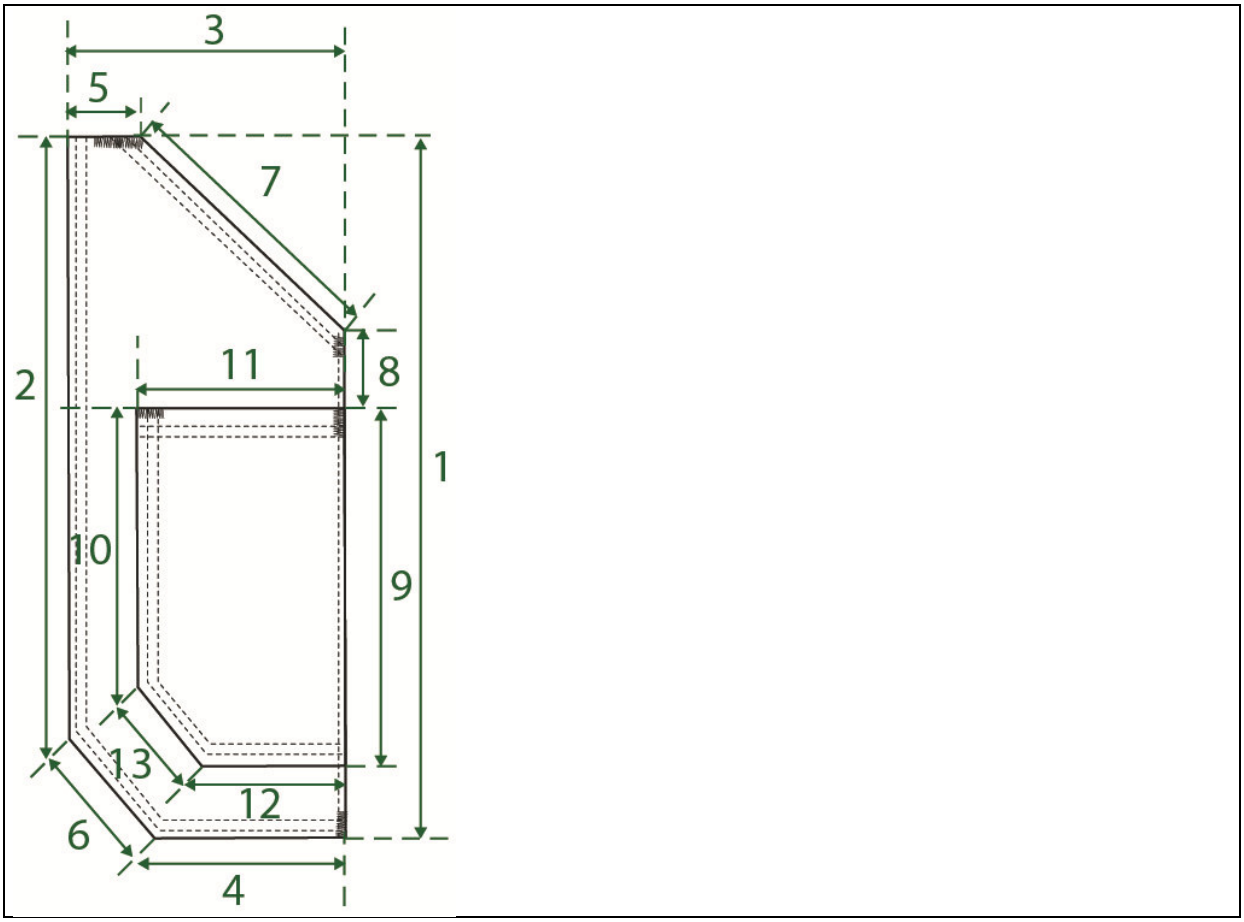


Fig: Side Pocket

Machine and operator summary of sewing Line:

M/C	No. of Operator
SNLS	32
DNCS	2
DNLS	8
5OL	4
3OL	4
EC	7
FOA	3
KAN	0.5
BARTACK	3

BLIND	0.5
SNCS	7
HP	17
IRON	7
Total	**95**

Here,

- SNLS – Single needle lockstitch Machine
- DNCS – Double-needle chain stitch machine
- DNLS – Double needle lock stitch Machine
- 5OL – 5 Thread over clock machine
- 3OL – 3 Thread Over clock Machine
- FOA – Feed of the Arm Machine
- KAN – Kansa sewing machine
- BARTACK – Bartok Machine
- BLIND – Blind stitch sewing machine
- SNCS – Single needle chain stitch machine
- HP – Helper
- IRON – Iron Machine

Operation Bulletin and SMV of a Cargo Pant :

Style Name & NO :		**SMV**		**Avg**	**10%+**	**0.36**	**Max**
Buyer:		30.74		0.32	10%-	0.29	Min
Description:		CARGO PANT		Efficiency	60%	65%	70%
				Tar/Hr	111	121	130
S/N	**M/C**	**Section**	**Operation**	**SMV**	**Tar/Hr**	**TAKT**	**Man Power**
1	HP	Patch	mark at coin pocket Facing	0.25	240	0.25	1
2	3OL		o/l coin pocket & front pocket Facing	0.32	188	0.32	1
3	SNLS		coin pocket Tack	0.28	214	0.28	1

4	SNLS		join coin pocket Facing with lining	0.32	188	0.32	1
5	SNLS		decorative stitch at coin pocket	0.31	194	0.31	1
6	DNLS		make coin pocket & front pocket	0.36	167	0.36	1
7	HP		mark at w/b inner	0.28	214	0.28	1
8	SNLS		tack w/b inner	0.36	167	0.36	1
9	SNLS		tack w/b upper	0.35	171	0.35	1
10	KAN		dummy stitch at w/b upper	0.36	167	0.72	0.5
11	HP		mark at w/b upper	0.26	231	0.26	1
12	IRON		1/16 iron w/b upper	0.42	143	0.42	1
13	SNLS		tack w/b inner & upper	0.39	154	0.39	1

14	EC		join w/b inner & upper	0.38	158	0.38	1
15	SNCS		t/s at w/b	0.75	80	0.38	2
16	IRON		press at w/b	0.58	103	0.29	2
17	SNLS		the main label join at w/b	0.29	207	0.29	1
18	SNLS		size label join at w/b	0.28	214	0.28	1
19	BLIND		loop make	0.25	240	0.5	0.5
20	SNLS	Back	stay stitch at back yoke	0.37	162	0.37	1
21	5OL		back yoke join	0.38	158	0.38	1
22	DNCS		back yoke t/s	0.39	154	0.39	1
23	5OL		back rise join	0.38	158	0.38	1

24	DNCS		back rise t/s	0.36	167	0.36	1
25	SNCS		back pocket Rolling	0.32	188	0.32	1
26	IRON		back pocket Iron	0.45	133	0.23	2
27	HP		mark back pocket Position	0.29	207	0.29	1
28	HP		scissor at back pocket & match with the body	0.28	214	0.28	1
29	HP		match front & back part	0.25	240	0.25	1
30	DNLS		back pocket Join	0.98	61	0.33	3
31	HP		mark at back yoke & knee	0.28	214	0.28	1
32	3OL		back part o/l	0.36	167	0.36	1
33	HP	Front	mark at the front part	0.32	188	0.32	1

34	EC		front pocket Lining join	0.38	158	0.38	1
35	DNLS		front pocket Mouth t/s	0.66	91	0.33	2
36	IRON		front pocket Mouth press	0.26	231	0.26	1
37	EC		front pocket Join	0.78	77	0.39	2
38	SNLS		t/s at front pocket	0.31	194	0.31	1
39	SNLS		front pocket Tack side & waist	0.68	88	0.34	2
40	3OL		o/l front rise, fly & fly box	0.34	176	0.34	1
41	SNLS		single fly join & edge stitch	0.36	167	0.36	1
42	SNLS		zipper join with a single fly	0.35	171	0.35	1
43	SNLS		J-stitch make	0.36	167	0.36	1

44	SNLS		J-stitch t/s	0.36	167	0.36	1
45	SNLS		join double fly with zipper & front rise	0.32	188	0.32	1
46	SNLS		zipper join with double fly	0.28	214	0.28	1
47	SNLS		front rise tack	0.29	207	0.29	1
48	SNLS		front rise t/s	0.23	261	0.23	1
49	HP		front pocket Opening mark	0.28	214	0.28	1
50	3OL		front part o/l	0.38	158	0.38	1
51	SNLS		tack at inseam point	0.31	194	0.31	1
52	5OL	Assemble	inseam join	0.69	87	0.35	2
53	FOA		inseam t/s	0.37	162	0.37	1

54	IRON		Press bottom Hem	0.28	214	0.28	1
55	BARTACK		bar tack at back pkt. & fly (5)	0.36	167	0.36	1
56	SNLS		side seam tack	0.34	176	0.34	1
57	SNCS		side seam close	0.72	83	0.36	2
58	SNLS		side seam tack & care label join	0.28	214	0.28	1
59	DNLS		cord stitch	0.42	143	0.21	2
60	HP		mark at the back part	0.29	207	0.29	1
61	HP		match belt with body	0.28	214	0.28	1
62	EC		w/b join	0.82	73	0.27	3
63	HP		turn body	0.32	188	0.32	1

64	SNLS		w/b tack	0.65	92	0.33	2
65	FOA		w/b down t/s	0.75	80	0.38	2
66	SNLS		mouth close-upper	0.38	158	0.38	1
67	SNLS		mouth close-lower	0.38	158	0.38	1
68	HP		mark loop position	0.28	214	0.28	1
69	HP		cut & match loop with body	0.27	222	0.27	1
70	SNLS		loop join	0.82	73	0.27	3
71	BARTACK		loop, cord stitch edge & fly bar tack (13)	0.7	86	0.35	2
72	SNLS		bottom hem tack	0.32	188	0.32	1
73	SNCS		make bottom hem	0.82	73	0.41	2

74	SNLS		bottom hem tack	0.31	194	0.31	1
75	HP		turn body	0.22	273	0.22	1
76	HP		thread cut	0.28	214	0.28	1
77	HP		sticker remove	0.26	231	0.26	1
			Total=	**30.74**	**171**	**25.28**	**95**

Task-3: Cargo pants invented:

Although, when the British military developed the first iteration of the cargo pant in 1938, desirability was probably the furthest thing from their minds--they eagling with was life and death, not aesthetics. As a result, the first cargo was a somewhat sloppy creation.May 27, 2013

What Fabric is Cargo Pants Made?

Generally, you will find cargo pants made from a variety of synthetic fibers or fabrics. That is because these fabrics are quick-drying and can handle the typein treatment you send their way. Also, to keep the pants looking nice and making sure they are easy to clean, a lot of cargo pants are made from a cotton synthetic blend. You get style, looks, and extra pockets when you opt to wear cargo pants.
If you want specific fabric names, you can go with Twill or linen. Both hold up well and provide you with a variety of colors you can work with. The thing about these fabrics is that you are going to have to pre-wash them thoroughly as they will shrink on you.

Best Fabric for Cargo Pant:

One of the features you want in cargo pants is a little stretch. You want those pants to remain comfortable and move well when you need to move quickly. So the best fabric for cargo pants would be a fabric that has a little spandex blended in with it.
Spandex gives you a stretch that is comfortable and easy. You should be able to move freely without getting in a bind. Spandex can be blended with polyester and cotton so you have a good choice which styles of pants you wear.100% polyester is a top fabric to use as well. It is comfortable to wear dries quickly and lasts a long time. Or you can go with a poly and cotton blend. Your style will look better and your body can breathe because of the added cotton fibers. Finally, a good cotton and nylon blend will

also give you a top fabric to make your cargo pants out of. These fabrics should give you all the properties you want to see in your pair of cargo pants.

Fabric Where to Buy Cargo Pant:

There should be no shortage of places to buy cargo pants. A short and very brief internet search turned up too many options to list here. Buying fabric to make your own has as many outlets to look through as does just buying pre-made cargo pants.
If you want to get wholesale proportions then you can try Ali Baba as that company offers a wide selection of cargo pants fabrics. Their wholesale price varies depending on how much you want to buy and what type of fabric you want to work with.
Because cargo pants are made from 100% synthetic and cotton-poly blends you have a large resource to check through when looking for fabric. Your local or national fabric stores should have plenty for sale at the prices you want.
If they don't you can go to the myriad of online fabric stores to stock up at cheaper prices. Amazon is just one place you can purchase cargo pants fabric online. You can also look at those fabric store closeouts taking place in your area or even ask people on sewing discussion forums for leads.
It would be surprising to hear that your mall's department stores did not have at least one bolt of the fabric for you to purchase.

The Benefits of Wearing Cargo Pant:

If you are trying to decide to make a pair or two of cargo pants, you should be aware of the benefits that come with them. They have many uses and make sure you are prepared for just about any situation.

Here are some benefits that cargo pants bring to your outdoor life:

1. They can be stylish - especially if they are black. You can go to a lot of places and not be rejected because you are violating their dress codes

2. They can be worn in a variety of places -the pants can look professional if you match them with the right shirt or blouse. And they can be great for casual outings like going to a movie, camping or just playing some pick-up ball games.

3. They are easy to keep clean -because the fabrics used to make these types of pants are easy to wash and quick to dry. You can be back in them before you know it.

4. The pants are comfortable to wear -that is an important factor as being comfortable allows you to put your attention where it belongs. You make a better first impression when you feel comfortable as well.

5. They are found everywhere - even if you make your own, you can find both the pants and the fabric everywhere. That convenience can save you time, money and frustration.

6. They come in a variety of colors -which is good news as no one wants their closet filled with the same color of pants. That color variety extends to the fabrics you buy when you want to make your own.

7. The fabrics are hard to snag - this is a very good selling point. Usually, the fabrics you use to make cargo pants are very durable and are very hard to ruin. They are tough fabrics that last.

8. They do not catch fire quickly -unlike fabrics for other styles of clothing cargo pants fabrics resist fires. That means you can be near a hot stove with flames or a campfire and not worry about a spark lighting you up.

9. The disintegrate very slowly -even slower than denim does. That factor helps them to last longer and look good for a long time to come.

10. They come with hidden pockets -some styles of cargo pants come with hidden pockets in the inside of the fabric. That means you can prepare for a variety of situations. You can also add those hidden pockets to the pants you are making.

There is no doubt that bill of lading is the most important aspect of commercial shipping. In my view the close second is the sampling of the cargo.

Just as we need to be watchful for bill of ladings, we need to be equally concerned about sampling procedures we adopt.

As per Swedish club, cargo contamination is the current major issue for chemical and product tankers. It would not be wrong to say that it is most costly type of claim too.

The cost of cargo carried on board chemical tankers is sometimes more than the value of ship itself. And as such if the cargo is off spec at discharge port, it could be a disastrous situation.

If the cargo is off spec during loading, there are two main sources for it. Contamination before the manifold valve and contamination after the manifold valves.

Our job is to ensure is that there is no chance of contamination after the manifold.

CHAPTER FOUR
STITCH

What is Stitch in Garment?

Stitch is very important during manufacturing a garment. Stitch can be defined as, one unit of conformation resulting from one or more strands or loops of thread by intra-looping, inter-looping and interlacing. Stitch quality is measured with stitch size, stitch length, width, depth, tension, sequence, elongation, elasticity, resilience, fabric distortion, yarn severance and abrasive strength. There are six types of stitch, which are deeply discussed in this article.
Different Types of Stitch Used in Garments:

There are different types of stitch used in garments; those are mentioned in the following:

1. Class-100 (Chain Stitch),
2. Class-200 (Hand Stitch),
3. Class-300 (Lock Stitch),
4. Class-400 (Multi Thread Stitch),
5. Class-500 (Over Edge Stitch),
6. Class-600 (Covering Chain Stitch).

All the above types of stitch have discussed in the below:
1. Class-100 (Chain Stitch):

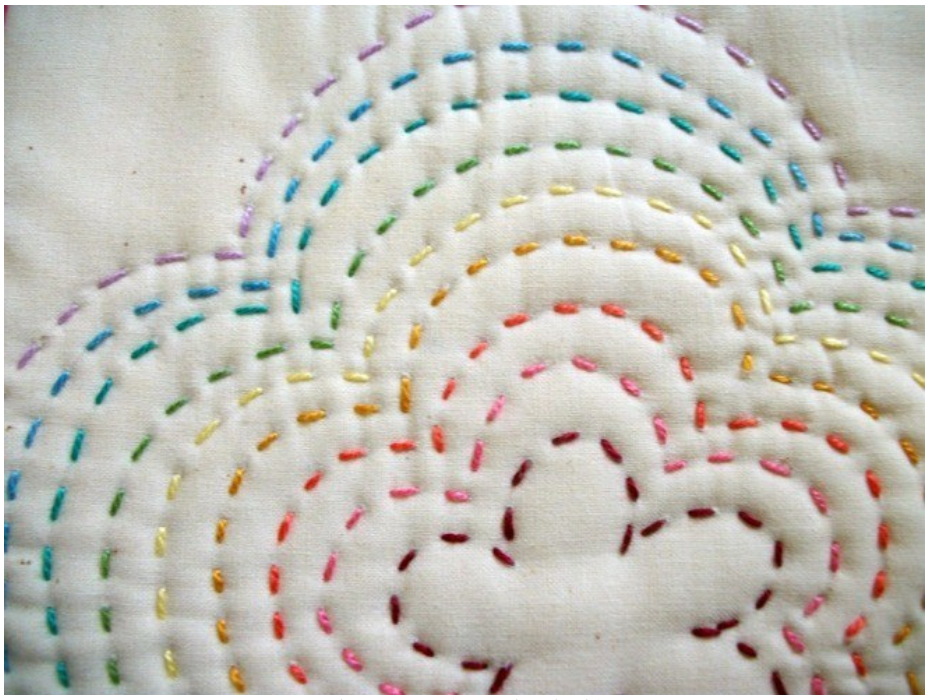
Class-100 named as chain stitch, which is produced by one or more needle threads and are characterized by interloping. In chain stitch, one needle thread is passed through the fabric, form needle loop and is secured by the next loop formed by the same thread. It should be noted that, chain stitch is elastic and thicker than lock stitch and can easily be raveled, where particular care is required to prevent run back from the last stitch.

Class-100 (Chain Stitch)

Class-100 (Chain Stitch) has three types- 101, 103 and 104. These types of stitch are used in hemming, belt loops, padding operations and felling.

2. Class-200 (Hand Stitch):

Class-200 named as hand stitch which is produced from a single thread. This single thread is passed through the fabric from one side to another and the stitch is secured by the single line of thread passing in and out of the garment.



Class-200 (Hand Stitch)

Class-200 (Hand Stitch) has four types- running basting, back stitch, diagonal basting and buttonhole stitch. These types of stitch are used for stitching costly dresses, jackets and sample dresses.

3. Class-300 (Lock Stitch):

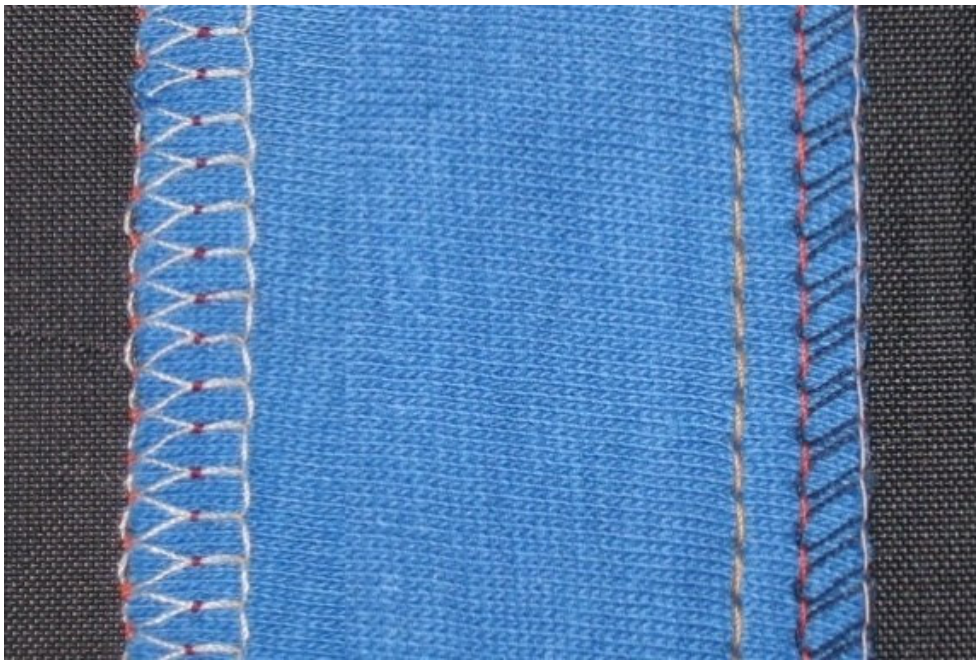
Class-300 named as lock stitch which is produced with two or more groups of threads and two threads are joined by interlacing. Here, loops of one group are passed through the fabric and are secured by the thread of second group, where one group is referred as needle thread and other as bobbin thread. Class-300 (Lock Stitch) has enough strength and same appearance on both sides.

Class-300 (Lock Stitch)

Class-300 (Lock Stitch) has four types- 301. 304, 308 and 309.These types of stitch are used for stitching underwear, most types and apparels and decorative purposes.

4. Class-400 (Multi Thread Stitch):

Class-400 named as multi thread stitch which is formed with two or more groups of threads. Here, loops of one group of thread are passed through the fabric and are secured by interlacing and interloping with loops of another group. Among two groups, one group is called needle thread and another group is called looped thread.



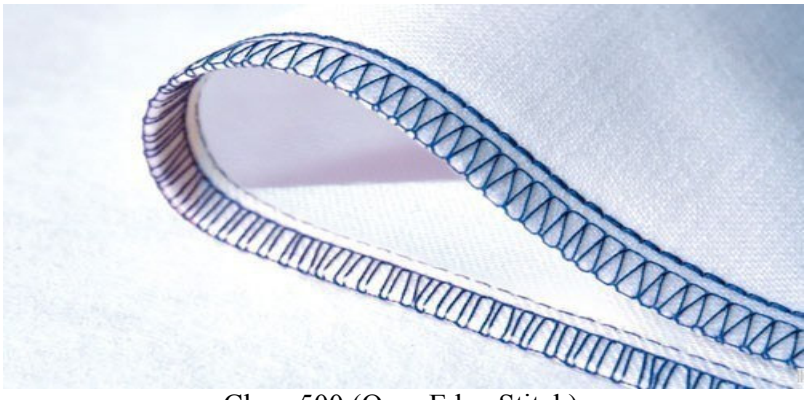
Class-400 (Multi Thread Stitch)

Class-400 (Multi Thread Stitch) has an appearance of lock stitch on the top but has a double chain effect formed by a blooper thread on the under-side.

Class-400 (Multi Thread Stitch) has three types- 401, 404 and 406. These types of stitch are used for setting elastic in waist bands and decorative stitching on belts.

5. Class-500 (Over Edge Stitch):

Class-500 named as over edge stitch which is formed with one or more groups of threads. In Class-500 (Over Edge Stitch), one group of thread passes around the edge of fabric so that no thread from the fabric can come out. The most used stitch of this type have one or two needle threads and one or two looped threads and thus forms a narrow band of stitching along the edge of the fabric.



Class-500 (Over Edge Stitch)

Class-500 (Over Edge Stitch) has three types- 503, 504 and 512. This type of stitch is used for edge neatening of knitted fabrics, where extensibility of stitches is important, also used for sportswear and dance wear garments.

6. Class-600 (Covering Chain Stitch):

Class-600 named as covering chain stitch which is produced with three groups of threads. Here, threads of two groups can be seen from either side. In class-600 (Covering Chain Stitch), the first group of thread is called needle thread, second group is called top cover thread and the third group is called bottom cover thread.

Covering Chain Stitch

Class-600 (Covering Chain Stitch) is very complex and up to 9 threads can be used in producing these types of stitch.

Class-600 (Covering Chain Stitch) has three types- 602, 605 and 607. These types of stitches are used for knits, lingerie, binding elastics, decoration, etc.

CHAPTER FIVE
CALCULATION OF SMV

Calculation of SMV:

Example for the first operation 'Back rise join lining part's AMV = Basic minute + Bundle allowances + machine and personal allowances [Add bundle allowances (10%) and machine and personal allowances (10%) to basic time] Now, we get Standard Minute value (SMV) = (0.25+0.05+0.05) = 0.3 minutes.A. Line balancing ChartLine balancing is the allocation of sewing machine according to style and design of garment. Line balancing Chart is such type of tool that indicates how a sewing line balanced. It describes every workstation and required time for completing individual task in sequence with the cooperation of Basic pitch Time (BPT).The line balanced according to our calculated SMV for the double layer men's shorts we found the following Line Balancing China.

For Calculating SMV – Standard Minute Value in Garments you must have a proper idea of machine operating procedure and working process of workers. Close observation of Industrial Engineer is required to calculate the right SMV for a particular product or style in your factory.

Basically, SMV is the sum of the basic time requirement and allowance applicable to it. Normally allowance is given at the rate of 10% based on efficiency.

Calculation of SMV in Garments:

SMV = (Basic Time + Allocated Allowance)

The formula of Basic Time = Observe Time X rating Factor

SMV of Cargo Pant:

NO	OPERATION	M/C TYPE	Count	SMV	TARGET 100% Efficiency	TARGET 80% Efficiency
	FRONT PART					
1	FLY FUSING	IRN	1	0.25	240	192
2	S/FLY +D/FLY + FNT RISE +SEAM+ FACING SERGING	5 OL	1	0.45	133	107
3	BODY SERIAL + THREAD CUT	Helper	1	0.2	300	240
4	SEAM MARK	Helper	1	0.3	200	160
5	FACING JOIN WITH PKTING + D/FLY MAKE	SNL	1	0.35	171	137
6	SEAM JOIN WITH PKTING	SNL	1	0.35	171	137
7	FNT PKTING JOIN WITH BODY	SNL	1	0.4	150	120
8	FNT PKT MOUTH ROLLING	DNL	2	0.5	120	192
9	FNT PKT HORI+VER TACK	SNL	1	0.4	150	120
10	FNT PKT BAG O/L	3 OL	1	0.35	171	137
11	PKT BAG TOP 1/4	SNL	1	0.38	158	126
12	S/FLY JOIN + TOP STC	SNL	1	0.35	171	137
13	ZIPPER JOIN	DNL	1	0.3	200	160
14	J TOP STC WITH MARK	DNL	1	0.35	171	137
15	D/FLY JOIN + BODY CLOSE	SNL	1	0.4	150	120

16	FNT RISE INSIDE TACK	SNL	1	0.5	120	96
17	FNT RISE TOP STC	SNL	1	0.55	109	87
18	CARE LABEL MAKE + JOIN WITH WAIST	SNL	1	0.25	240	192
19	**FNT PART CHEACK**	QC				
20	**MAKE SECTION**					
21	FLAP +W/BELT FUSING	IRN	1	0.2	300	240
22	REINFORCEMENT CREASING (4 PICS)	IRN	4	0.4	150	480
23	FLAP TOP STC	SNL	1	0.4	150	120
24	THAI PKT DART MAKE	SNL	2	0.35	171	274
25	THAI PKT DART TOP STC	SNL	1	0.28	214	171
26	THAI +BK PKT FLAP MAKE	SNL	2	0.6	100	160
27	THAI +PKT FLAP TOP 1/4	SNL	2	0.5	120	192
28	THAI PKT O/L	3 OL	1	0.3	200	160
29	THAI PKT+THAI COIN PKT ROLLING	SNL	1	0.4	150	120
30	THAI COIN PKT LOOP JOIN+DECO STC	SNL	1	0.4	150	120
31	THAI COIN PKT VELCO JOIN	VELCU	1	0.4	150	120
32	THAI COIN PKT JOIN	SNL	1	0.45	133	107
33	**BK PART**					
34	BK RISE JOIN	SNL	2	0.65	92	148
35	BK RISE TOP STC	DNL	1	0.62	97	77
36	BK PKT SERGING	5 OL	1	0.55	109	87
37	BK PKT ROLLING	SNL	1	0.35	171	137
38	BK PKT+FLAP POSITION MARK	Helper	2	0.65	92	148
39	BK PKT JOIN WITH REINFORCEMENT	SNL	2	0.4	150	240
40	BK PKT 1/4	SNL	2	0.3	200	320
41	BK PKT PLAP JOIN	DNL	1	0.5	120	96
42	BK PART LBL JOIN	SNL	1	0.3	200	160
43	**BK PART CHEACK**	QC				
44	**ASSEMBLY**					
45	FNT+ Bk PART + MATCHING	Helper	1	0.3	200	160
46	SIDESEAM JOIN	5 OL	1	0.48	125	100
47	SIDE SEAM TOP STC	FOA	1	0.4	150	120
48	MARK THAI PKT,BTM HEM	Helper	2	0.45	133	213
49	THAI PKT JOIN	SNL	2	0.7	86	137
50	THAI PKT 1/4	SNL	2	0.6	100	160
51	FLAP MATCH	Helper	1	0.2	300	240
52	FLAP JOIN	SNL	1	0.4	150	120
53	FLAP TOP STC	SNL	1	0.48	125	100
54	LOOP MAKE	FL	1	0.35	171	137
55	MARK LOOP JOIN + CUT	Helper	1	0.4	150	120
56	BON PKT POSITION MARK	SNL	2	0.65	92	148
57	BON ROLLING	SNL	1	0.3	200	160
58	BON MACHING +BON LENGHT MARK	Helper	1	0.2	300	240
59	BON CREASING	IRN	1	0.4	150	120
60	BON JOIN	DNL	1	0.7	86	69
61	BON CUT + TURN OVER	Helper	1	0.35	171	137
62	BON TOP STC DOWN SIDE	SNL	1	0.65	92	74

63	BON PKTING HERMONIUM FACING SERGING	5 OL	1	0.52	115	92
64	BON PKTING SERGING	5 OL	1	0.45	133	107
65	BON PKT FACING JOIN WITH PKTING	SNL	2	0.7	86	137
66	BON TOP STC UPPER SIDE	SNL	1	0.6	100	80
67	BK BON PKT INSIDE TACK	SNL	1	0.55	109	87
68	W/ BELT MARK+ ALLOWANCE CUT	Helper	1	0.35	171	137
69	W/BELT CREASING	IRN	1	0.35	171	137
70	W/BELT POSITION MARK	Helper	1	0.25	240	192
71	W/BELT MATCHING	SNL	1	0.3	200	160
72	W/BELT JOIN	SNL	3	0.85	71	169
73	W/BELT ELASTIC CUT + MARK	Helper	1	0.4	150	120
74	W/BELT ELASTIC TACK	SNL	2	0.55	109	175
75	W/BELT TOP STC(ELASTIC PART)	K-S	1	0.55	109	87
76	W/BELT TOP STC	K-S	2	0.75	80	128
77	MOUTH CUT	Helper	2	0.35	171	274
78	MOUTH REMOVE	Helper	2	0.3	200	320
79	MOUTH CLOSE	SNL	2	0.84	71	114
80	LOOP DEEP TACK	SNL	1	0.6	100	80
81	INSEAM JOIN	5 OL	1	0.35	171	137
82	INSEAM TOP STC	FOA	1	0.38	158	126
83	BTM HEM ROLLING	SNL	2	0.75	80	128
84	VELCROW POSITION MARK	Helper	2	0.65	92	148
85	VELCROW JOIN	VELCROW	2	0.75	80	128
86	FINAL THREAD CUT	Helper	2	0.5	120	192
87	**FINAL TABELTE**	QC				
88	**TOTAL**		107	**36.28**	2	142
				36.28		

Standard Minute Value: SMV in Garments, Calculation, Importance:

The term Standard Minute Value – SMV is mostly used in the garments industry. It is a process of time study and measure standard minute and then calculates the SMV. The calculation of SMV is actually done by the Industrial Engineer. Generally, SMV indicates the time taken to make garments by the workers using the right types of machinery. In the garments factory, you may find that many people used to the SAM – Standard Allowed Minute which is the same as SMV. SMV varies garments to garments, style to style, factory to factory. Management and buyers ask for SMV and it is the responsibility of the IE department to calculate SMV and give it to the respective parties. Here in this article, I will share details of Standard Minute Value: SMV in Garments, Calculation, and Importance with a practical example.

The Main Objective of Industrial Engineering:

- To Increase Productivity
- To eliminate waste and non-value added activities
- To come up with the optimum use of scarce resources that would bring out the best results.

Importance of SMV in the Apparel Industry:

The reason why we use SMV in Garments Factory is given below

- SMV is calculated for doing costing of garments
- It is used for calculation of target and set the right target
- For Calculating the Efficiency of workers
- SMV is calculated for making a plan and takes effective factory production decisions.

Basic Time:

Basic time is the most likely time required to make garments considering observe time and applicable rating factors.

Observe Time:

Time is taken to do work when an observer is observing closely and record the worker's work speed.

Calculation of Observe Time =Total Cycle Time is divided by Number of Cycle

Cycle Time:

Cycle Time is the time between starting a garment manufacturing and finishing of those garments.

Rating Factor:

The rating factor is assigned based on an evaluation of worker performance which is conducted through eye judgment. A worker can be fast, slow and rating is on a scale of 100% to lower. Costing SMV is calculated for sending SMV information to buyers. Normally 5% additional time is added with the actual SMV.

Costing SMV = Actual SMV + (Actual SMV x 5%)

Example of Calculation of SMV in Garments:

Suppose for making a product the following assumption is there

- Observe Time = 25 Minutes
- Rating of Operator = 80%
- Considering Allowance = 10%
- Basic Time = 25minutes x 80% = 20 minutes
- Allowance = 20 x 10% = 2 Minute

So, SMV = 20 minutes + 2 minutes = 22 minutes for making a particular garments product

SMV Calculator:

You can use the following calculator to quickly calculate the SMV of garments.

Cargo pants measured:
Waist circumference must be ascertained by applying the measuring tape to the thinnest part of your waist. The inside leg is the measurement which you require for trouser leg length. Please be sure to measure from the crotch right down to the sole of your foot on the inside of your leg whilst you'reis outstretched.

What material are cargo pants?
Cargo pants are made of hard wearing fabric and ruggedly stitched. Increasingly they are made of quick-drying synthetic or cotton-synthetic blends, and often feature oversized belt loops to accommodate wide webbing belts.

A brief history of cargo pants, the military's greatest fashion Contribution:

Cargo pants, a product of military influence, rose to prominence among civilians in the 1990s.
Photographer Bill Cunningham once said, "Fashion is the armor to survive the reality of everyday life."
For those serving in the armed forces that statement is far more literal than figurative. As a result, the military has, over the years, become a driver of clothing that is not only worn in battle, but civilian attire as well.
From the trench coat to the pea coat and acetate glasses frames, the military has an oft-unacknowledged influence on the fashion world. But there is one particular item, laughed at by some as the antithesis of sartorial elegance that traces its roots to militaristic origins more than any other: cargo pants.
The earliest iteration of the cargo pant was the pocketed trouser-type worn in the 1930s by British soldiers in battledress, according to author Brian Jewell.
British records of the uniform adopted around World War II show modified trousers. (UK Forces War Records)
British records of a uniform adopted around World War II show modified trousers. (UK Forces War Records)
"In the 1930s the War Office grew increasingly aware of the need for a new and more rational combat dress, and by 1937 the design for what would become known as 'battledress' was complete," reads the summary of "British Battledress 1937-61."
"Though the change in uniform was initially disappointing to the British soldiers, the new battledress served its purpose well, clothing the servicemen for more than 25 years with reasonable warmth and convenience."
It was indeed a diversion from the more formal uniforms that for centuries made the voguish British Army a fearsome thing to behold (especially during that era when it sported red coats). But the more relaxed dress eventually caught on, with the United States, notably paratroopers, also modeling its World War II-era uniforms closely after it.
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One German officer, wary of American forces closing in, commented in his diary about the distinguishable appearance of the U.S. paratroopers.
"American paratroopers — devils in baggy pants — are less than 100 meters from my outpost line," he wrote. "I can't sleep at night; they pop up from nowhere and we never know when or how they will strike next. Seemslike the black-hearted devils are everywhere."
It wouldn't be long before each U.S. military service adopted the utility pants.
"Based on the success of that paratrooper pant, after World War II the dual pocket cargo pant became standard issue for almost all branches of the U.S. military," GQ reported.
In 1952 the Army adopted the OG-107s — olive green dual-front-pocket pants that tucked into the boots — who were swiftly replaced by the ever-popular and evolving BDU.
As for the civilian market, cargo pants enjoyed a heyday in the 1990s. In fact, Complex praised them as number seven on its 90 best trends from the 1990s list, writing, "Cargo Pants were like SUVs for your legs. It's no wonder why both things experienced such a boom in the '90s."
Indeed, contemporary cargo pants are notorious for their baggy fit and "patch pockets." And though they

are now most often donned by dorky dads who pair them with New Balance tennis shoes, or vet-bros yet to graduate to fitted jeans of slacks, they'll always hold a special place in military history — and our hearts.

Operation Breakdown and Machines Types Used for Making a Cargo Pant:

I made this operation breakdown in my college days as one class assignment. I visited one garment export house (factory) to study garment for this assignment. That time factory was making Cargo Pants (in Khaki fabric). It was a nice product.

When I started making an operation breakdown, first I was overwhelmed by looking at a number of operations of the cargo pant. In a cargo pant, I can only see double-needle stitching with thicker threads. Don't know where to start and how to breakdown operations. Then I follow the process, the way line was making that cargo pant. Finally, I made it and corrected later stage.

I did time study for most of the operations and also did motion study using SPD code and TMU values (Sewing Process Data). Here I am only sharing operation breakdown and machine types used for operations. I don't have the actual image of the cargo pant that I had studied. Following image is just for an indication. Construction and styling of the actual cargo pant were different than this one.

The cargo pant that you have maybe different in styling and construction. By reading operation name here you can relate with your product and refer this for making your operation breakdown and modify where needed following your sample.

Machines Types Used for Making a Cargo Pant:

Open Code.	Operation Description.	Machine Type.
SLNo:	**Back Panel:**	
A01	Attach left piece and middle piece of the back panel -SNLS	
A02	Attach 3rd piece to the previous one -SNLS	
A03	O/L the raw edges 4 thread -O/L	
A04	Topstitch on the stitch line-DNLS	
A05	Design stitch on back yokes-SNLS	
A06	Sew yoke with Back panel-SNLS	
A07	O/L of yoke and back seam-4 thread O/L	
A08	Top stitch at yoke -DNLS	
A09	Strip attach inside back panel at pocket opening-SNLS	
A10	Back pocket attachment -SNLS	
Front Panel:		
B01	Sew front parts-SNLS	

B02	O/L the raw edges 4 threads-O/L
B03	Topstitch on the stitch line-DNLS
B04	Sew top pocket (side pocket) ply to pocket mouth (inside out)-SNLS
B05	Fold out and Top stitch to pocket mouth -SNLS
B06	Stitch side pocket all three sides-SNLS
B07	O/L front crotch area (J shaped) 4 -O/L
B08	Zipper Fly attach to left panel-SNLS
B09	Zipper attach to Zipper fly-SNLS, single presser foot
B10	J-Stitch on the top of left panel at zipper area-SNLS, single presser foot
B11	Right Zipper fly attached to zipper-SNLS
B12	Right fly attached to right pane-SNLS
Side Pocket:	
C01	Attach rectangular patch on middle ply -SNLS
C02	Place two pocket facing on the both side of it and stitch at curved area -SNLS **with edge cutter:**
C03	Take inner side out and top stitch at curved area -SNLS
Side Patch Pocket:	
D01	Hand creasing and fold, stitch at bottom corners and fold out -SNLS
D02	Pressing the folded edges-Iron
D03	Top stitch at upper folded edges all three sides-DNLS
D04	Sew folded portion at pocket mouth -SNLS
D05	Zipper bottom fly attach pocket mouth -SNLS
D06	Zipper stitch with bottom fly-SNLS
D07	Sew upper fly with zipper -SNLS
D08	Sew small pocket on big one-SNLS
D09	Attach flap -SNLS
Small patch pocket:	
E01	Hand creasing and fold, stitch at bottom corners and fold out-SNLS
E02	Hemming pocket opening and attach button loop -SNLS
E03	Sew folded portion at pocket mouth (outer fold) -SNLS
E04	Top stitch at upper folded edges all three sides-DNLS Compensating P/F
Small patch pocket Flap:	
F01	Fusible interlining -Fusing m/c
F02	Side fold first then center fold and top stitch DNLS,-Compensating P/F
Waist Band preparation:	
G01	Fusing interlining all three parts (Inner& Outer both)-Fusing m/c
G02	Folding and Pressing (outer) and marking using template Iron and template
G03	Stitch front parts to back part (both inner & outer)-SNLS
G04	Stitch inner and outer waist band (F to F) -keeping a small patch SNLS
With edge-cutter:	
G05	Pressing waist band at the stitch line-Iron
G06	Attach size label to brand label -SNLS
G07	Attach brand label to inner waist band Automated -SNLS
G08	Stitch ends of band-SNLS
Back pocket:	

H01	Serge pocket piece opening-3 thread O/L
H02	Serge the strip-3 threads O/L
H03	Stitching of pocket opening-SNLS
H04	Folding pocket mouth and stitch at sides of opening-DNLS
H05	Press three edges of pocket-Hand iron
Belt loop:	
I01	Run stitch-SNLS
I02	Pressing-Hand iron
I03	Closing of one end of belt loop-SNLS
I04	Pressing-Hand iron
I05	Top stitch on center-DNLS, Compensating p/f
I06	Cutting according to loop length-Hand scissors
Zipper flap:	
J01	Serge left zipper fly-3 thread O/L
J02	Fold and run stitch on right zipper fly-SNLS
J03	Over lock stitch right zipper fly 3 threads O/L
Assembly:	
K01	Side seam (Front and back attach)-SNLS
K02	Over lock side seam-4 thread O/L
K03	Patch pocket attach-SNLS
K04	Inseam-SNLS
K05	O/L the edges (inseam)-4 thread O/L
K06	Topstitch on inseam-DNLS
K07	Attach left and right panel at seat and crotch area-SNLS
K08	Over lock stitch-4 thread O/L
K09	Counter stitch-SNLS
K10	Attach lower part of belt loop-SNLS
K11	Attach waist band with wash care label-SNLS
K12	Top stitch on waist band DNLS,-Compensating p/f
K13	Second stitch on at lower side of belt loop-SNLS
K14	Marking and Design stitch on belt loop and top end joining-SNLS
K15	Bottom hemming-SNLS
K16	Stitching of zipper flaps at lower ends-SNLS
K17	Second Brand label attach-Computerized L/s m/c
K18	Bar tack at loops, on J-stitch-bar tacking m/c, raised bed

Machine name abbreviation:

- SNLS - Single Needle Lock Stitch
- DNLS - Double Needle Lock Stitch
- O/L - Over lock Machine
- M/c - Machine
- L/S - Lock Stitch

CHAPTER SIX
CONCLUSION

Conclusion

This research is based on an effective layout model of Seven pocket cargo pant where to use balancing process using short cut method. Here it is suggested to follow pitch diagram method to identify bottleneck operations and to solve the problem by 100 percent balancing. During the research it is seen thread trimming is being done manually using helper which is non value added unnecessary operation can be removed by setting auto trimmer along with machine or by using auto machine. The study shows that this balanced layout model has brought a better synchronization among man machine and materials increasing the efficiency and productivity. Traditionally operated garment industries are facing problems like unnecessary operations, wastage, rejection, poor line balancing etc. This problem can be eradicated by getting used with 5S (Sort, Set in order, Shine, Standardization and Sustain) method and making the working environment totally visualized. Here to achieve better quality and cost effective production Standard Operation procedure (SOP) is followed. By following SOP unnecessary operations are being able to find and due to follow standard procedure wastage and rejection will gradually come down at a tolerable level to zero. Thereafter in this way expected productivity and efficiency can be obtained which is the main goal of this research.

CHAPTER SEVEN
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