A Brief History of Trouser and Pattern Making Process of Basic Trouser According to the Industrial Measurement Chart with Instructions

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Abstract:

A piece of cloth which is two-legged, named Trouser. This is worn on the bottom of the body part. It's more comfortable to move while wearing trousers than dresses; it's the most important item for both men and women. Both men's and women's trouser workmanship is quite similar to creating a manual pattern. We have to follow some measurements to create a trouser pattern and those measurements are varying from size to size. In the garment production cycle, the pattern-making process plays a very important role, because the fitting of garments mostly depends on the perfection of a pattern.Bearing in mind that, in reality, there's no such thing as a customary or perfect figure, the formulas for constructing a basic trouser pattern are designed and developed for the quality figure. The research is trying mathematically to unravel and overcome the matter of fitness and might put a step to resolve this deficiency to create a trouser pattern by following the measurement chart.

Keywords: *Trouser, pattern making, workmanship, Material study, Measurement chart, Mathematical solution, Fitness, Garment industry.*

1. Introduction

Trousers have been worn within the Western world since history. They're now the foremost common kind of lower-body clothing for men. Practical and comfy, there's no wonder that they've been adopted by both sexes as a part of their everyday dress. Trousers were first invented because robes are uncomfortable to decline horseback. Those that wore trousers in battle had the whip handed over to people who wore robes. For this reason, civilizations everywhere on the planet adopted this manner of dress to survive the battle.

Despite being worn by both sexes in times of yore, trousers were a "masculine" garment for many years. Instead, women wore long, voluminous skirts. But, within the nineteenth century, women started wearing types of trousers again. They were worn just for horse riding, although they wore skirts on top of them to stay hidden.

By the 1880s, women within the west finally started wearing trousers for leisure activities. They were safer to wear when cycling because the trousers were far less likely to urge caught within the wheels. They also allowed greater freedom of movement. Additionally, they were considered healthier to wear than the cumbersome skirts they sometimes wore. Despite their increasing popularity, women did not start wearing jeans until the 1970s. In fact, in some places, it had been illegal for ladies to wear trousers. Nowadays, trousers are worn by women for all occasions with no masculine connotations

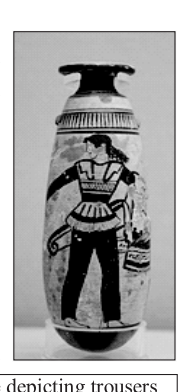
1.1 Origin

Trousers were first made by the sixth century BC Greek geographers. It's recorded that Persian, Eastern, and Central Asian horse riders were wearing trousers. From this time and after that period wearing trousers was a comfortable and practical choice during horse riding.

Ancient ceramics found that male and female horse riders wearing trousers. We can see an example of this on the vase to the right, depicting an Amazon woman.

On other hand the Ancient Greeks snubbed the garment, finding them ridiculous. They nicknamed them 'thulakos,' meaning 'sacks'.

After that, the Romans (who held the Greeks in high esteem) rebuffed them as well. They considered them as garments worn by barbarians. But as the empire spread further around the world, trousers gained more popularity. They couldn't deny the warmth and practicality that trousers offered them.



A vase depicting trousers dating back to about 470 BC

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1.2 Developing History of Trouser

Trousers were used by the military. They wear snug shorts or loose-fitting trousers that are closed at the ankles. Towards the end of the 14th century, it evolved into tight trousers with attached foot coverings. It resembled a hose and was worn beneath the scale by knights. A trousers' shape that is worse than it was by 1500.

In addition to being voluminous and made of decorated fabric, it ballooned over the thighs and nipped in at the ankles. On the underneath, some slashes reveal the colorful lining. At the time, trousers were slimmed down to simple breeches that fastened at the knee. However, these were later replaced by ankle-length trousers worn by laborers. We began to see trousers like the ones we wear today in the 19th century. Despite their loose fit and button fly, these pants were worn in neutral colors. The eldest son of Victoria, the first British monarch who introduced trousers as we know them today. He also introduced trousers creases into the mainstream^i.

Trousers were originally worn in the military and on horseback

2. The workmanship of Trouser

Trousers have different names in different countries. In the U.S., most people refer to it as pants, while in the U.K. it is called underwear. When trouser length is above knees then it is called shorts and if they're made with denim you can call them jeans. In Scotland, trousers are sometimes called trews, one possible root of the word. Another source may be the Gaelic triubhas, "close-fitting shorts." Trousers have many parts which are described below -

2.1 Top Side: Front half of trouser leg

2.2 Underside: Back half of trouser leg

2.3 Waist Belt: The waistband is a thin strip of the fabric where buttons or hooks are wrapped around the waist.

2.4 Belt Loop: This is attached over the waistband, it is a narrow, vertical strip of cloth. Loops help secure the positioning of a belt. Five to seven loops usually have on trousers but the standard is six loops.

2.5 Front Fly: It is a fabric flap that hides a closure system like a zipper, button, etc. There have different types of fly -

-Zipper fly
-Button fly
-Mock fly
-French fly

Most commonly used French fly as it gives a plain seamless clean look.

2.6 Front Pockets: Men's trousers have a pair of the front pocket. It is a straight up and down slit with very thin hemming or no hemming. The most common style is a slanted pocket. Set-in pockets- single or double welted and on-seam pockets are also used.

2.7 Back Pockets: Back pockets can be on the back of both sides of the trousers, or only on the wearer's right. Pocket is inserted on the garment through a slash in the mainfabric; it's called hind pocket. Back pocket can be:

-single welt button through pocket;
-Double-welted button-through pocket (with a working buttonhole or a button tab)
-Welt pockets with a flap.

2.8 Back Darts: Trousers have one or two darts on the underside of the trouser. Dart length and width depends on the size of the trouser.

2.9 Plain Hem: No visible stitch line on the outside of trouser bottom it is called plain hem. Invisible stitch

is done with a blind stitch. Seam allowance is around 4.0 cm high to provide.

"The hem should slope slightly downward toward the heel, stopping about 2.5 cm above the shoe welt" (M. P. Londrigan, 2009). The width of the trouser bottom should cover the shoelaces.

2.10 Cuff: It is a folded back continuation of the trouser leg. Another hand it's called turns up. "Cuffs, which go in and out of fashion for business attire, generally range from 3.0 to 5.0 cm, remaining the same depth around the leg of the pants but being canted ever so slightly in the front to allow for what, in an uncuffed pants leg, would be the break against the shoe. The general rule for depth is: the taller the man, the deeper the cuff" (M.L.Gavenas, 2008).

"Turn-up is a nice addition if one's pants have folded because a cuff's added weight keeps your pant creases sharper and straightens the trouser leg" (M. P. Londrigan, 2009).

However, it is not a rule that pleated trousers have to be cuffed, nor it is a rule that cuffs should not be added to flat-front trousers. Only trousers that should never be cuffed are ones worn with a morning coat, tuxedo, and tailcoat (B.Roetzel). Making trousers hang and drape a cuff requires extra material.

3. Material Study

Garments' material depends on their function and style. Below is a list of Basic trouser-making material.

3.1 Main Fabric (Shell fabric): Many types of fabric are used for trousers. Trouser fabric should be draped cleanly and consistently. To follow this feature mainly used fabric name is given below -

- Whipcord
- Covert
- Cavalry twill
- Serge
- Bedford cord
- High twists
- Flannel
- Gabardine
- Corduroy
- Moleskin
- Chinos
- Denim

3.2 Pocketing & Knee lining Fabric

It's a strong, thin, finely woven fabric. It's used to make the hidden part of the pocket, and it's also commonly used as flat-lining or underlining on well-made garments. Pocketing and knee lining fabric are made from Pocketing, shield lining, and fork lining are made from the same cotton fabric. This vegetable fiber is chosen because of its suitable properties. "Cotton is very comfortable next to the skin because of its fineness and softness "(H. Eberle, M. Hornberger et al, 2008, p243). Since the woolen fabric is elastic and prone to bagging, men's trousers are made with front lining, because the knee area is affected the most during wearing, especially sitting. Knee lining is usually made of viscose; it feels comfortable next to the skin. Some of the cheaper trousers have a polyester lining, which is more durable and cheaper, but less skin-friendly than viscose lining.

3.3 Interlinings

The main purpose is to use interlining to strengthen the shell fabric. Waistband width is determined by waistband interlining. Interlining is creating a stiff and durable finish and preventing the waistband from curling and giving good shape. It is also strengthening pocket openings, fly front, facing and shield. Also, pocket welts are stabilized with fusible interlining.

3.4 Trimmings and Fastenings

"A garment is made not only from the apparel fabric but also various accessory items. These have to be

chosen in a way that they complement the outer fabric both aesthetically, in terms of decoration, and practically, in terms of ensuring that the garment performs as expected in its intended end use"(H. Eberle, M. Hornberger et al, 2008, p243).

- **Binding tape** is cut on the bias and used for finishing raw edges of seam allowances. It is needed for a clean finish and makes seams lie flat. Binding is usually made of knee lining fabric complements or is tonal with pocketing waistband, and knee lining details.
- **Coil Zipper** is the main closure for trousers which is situated on the center front. It is from 16 cm to 20 cm long, depending on the position of the waist of the trousers, therefore the length of the fly.
- **Hooks and bars** are used only on the waistband (never as an anchor button), instead, or in a combination, with the buttons. It provides a firm and durable closure.
- **Buttons** are mostly dyed to match (DTM) with trousers. Usually, plastic buttons are used, diameter 1.5 cm. Buttonholes for pants are always with an eyelet. Same buttons as on the waistband are also used for the anchor button and back pocket button.
- **The thread** used for trousers is DTM and depending on the fabric weight, usually No 120. All threads have to be tonal with the fabric they are sewn on. E.g. When sewing pocket facings on the pocket bag of different colors, bobbin and needle thread have to be a different color. It creates a smooth finish, covers raw edges well, and will stay unseen and flat when pressing seam allowances.

4. Pattern Making

The first step of pattern making is to take the measurement. Lower body measurements are required for making trouser patterns.

4.1 Measurement chart with specification

Here we follow the measurement chart which is used in the garments industry. Measurement can vary depending on human structure, country to country but pattern-making calculation and instruction are constant.

Sl.	Measurement Name	Measurement (Size M)
1	½ Waist	43.5cm
2	½ Hip (18cm from waist including wb)	54cm
3	½ Thigh	32.5cm
4	½ knee	21cm
5	½ bottom hem	16.5cm
6	Waistband height	4cm
7	Fly length	14cm
8	Fly width	3.5cm
9	Front rise including waistband	25cm
10	Back rise including waistband	39cm
11	Front pocket width	4.5cm
12	Front pocket height	15cm
13	Inseam	72cm

4.2 Calculation

Measurement name	Short name	Calculation	Result
½ Waist	WT	43.5cm/2	21.75cm
Front Rise	FR	25cm-4cm (waistband height)	21cm
Back Rise	BR	39cm-4cm (waistband height)	35cm
½ Hip	HP	54cm/2	27cm
½ Thigh (Front)	THF	32.5cm-2cm	30.5cm
½ Thigh (Back)	THB	32.5cm+2cm	34.5cm
½ Knee (Front)	KNF	21cm-1cm	20cm
½ Knee (Back)	KNB	21cm+1cm	22cm
½ Bottom Hem (Front)	BHF	16.5cm-1cm	15.5cm
½ Bottom Hem (Back)	BHB	16.5cm+1cm	17.5cm

4.3 Pattern making Instruction of Topside & Outside

- 0-1: FR 21cm
- 1-2: Inseam 72cm
- 1-3: Midway between 1-2 = 72cm / 2 = 36cm
- 0-4: Hip height 18cm -4cm (waistband height) = 14cm
- Square across from 1, 2, 3 & 4
- 4-5: HP 27cm, Square up to 6
- 1-7: THF 30.5cm
- 1-8: THB 34.5cm
- 6-9: Inward 1.3cm, add 9 to 5, draw a curve from 5 to 7
- 7-10: FR 21cm (measure curve from 7 and mark point 10)
- 8-11: 1.3cm square down
- 9-12: 1.3cm, add 12 to 5, draw curve from 11 to 5
- 11-13: BR 35cm (measure curve from 11 and mark point 13)
- 10-14: WT 21.75cm (front waist), add 10 to 14 with a slight curve
- 13-15: WT 21.75cm (back waist) + 1.5cm (dart width) =23.25cm
- 16: Divide 13-15, square down from 16 for dart length
- 16-17: 7cm dart length
- 16-A1: 0.75cm, 1.5 (dart intake) /2 = 0.75
- 16-A2: same as 16-A1, add A1 to 17 & A2 to 17
- 1-18: Midway between 1-7, square down to knee and mark point 19 then extend the square line up to bottom line and mark point 20.
- 19-B1: KNF 20cm/2 = 10cm
- 19-B2: Same as 19-B1
- B1-B3: KNB 22cm
- 20-C1: BHF 15.5cm/2 = 7.75cm
- 20-C2: Same as 20-C1
- C1-C3: BHB 17.5cm

4.4 Pattern making Instruction of Front curve

- Out-seam: Make a curve from 14 to 4, 1 to B1, and B1 to C1.
- In-seam: Add 1 to B3 with a slight curve and add B3 to C3.

4.5 Pattern making Instruction of Front pocket with pocket bag

- 14-P1: Front Pocket width 4.5cm
- 14-P2: Front pocket height 15cm, add P1 to P2
- P1-P3: Pocket bag width 12cm
- P2-P4: 4.5cm
- P3-P5: 26cm (Pocket bag length)
- P4-P6: 1.9cm
- P1-P7: 3.2cm and make a parallel line.
- Create pocket bag shape as like drafting

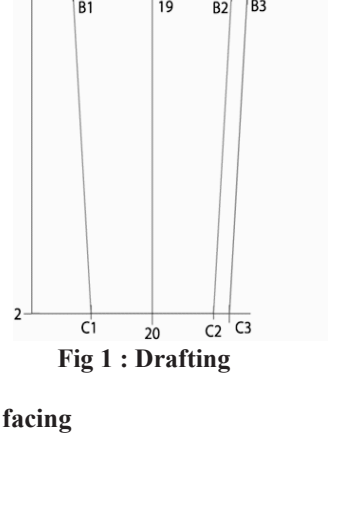


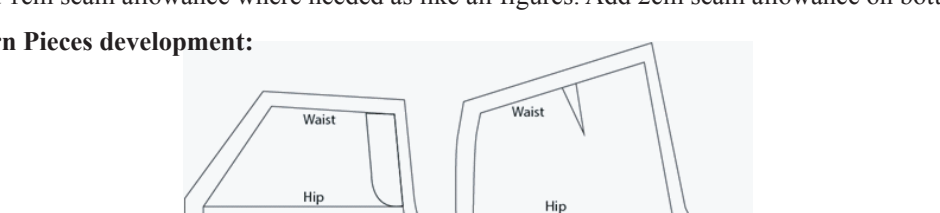
Fig 1 : Drafting

4.6 Pattern making Instruction of Front Fly Button Stand and Front Fly facing

- 10-F1: Fly width 3.5cm
- 10-F2: Fly Length 14cm
- For fly button stand, trace fly facing from drafting and

4. 7 Pattern making Instruction of Waistband

- W1-W2: Height of waistband 4cm
- W1-W3: Total Waist 87cm
- W3-W4: 3.5cm for a fly extension



4.8 Tracing

4.8.1 Top side: Trace through point 14, 10, 5, 7 B2, C2, C1, B1, 1 & 4

4.8.2 Outside: Trace through point 15, 13, 12, 5, 11, B3, C3, C1, B1, 1 & 4

4.8.3 Front pocket:

- Top pocket bearer: Trace through points 14, P7, P4 & P2
- Under pocket bag: Trace through points 14, P3, P5, P6, P4 & 4
- Top pocket bag: Trace through points P1, P3, P5, P4 & P2
- Top pocket facing: Trace through points P1, P7, P4 & P2
- Fly facing: Trace through points 10, F1 & F2
- Fly button stand: Trace front fly. Draw a straight line, fold and flip the flyover along this line, and mirror it.

Note: Add 1cm seam allowance where needed as like all figures. Add 2cm seam allowance on bottom hem.

4.9 Pattern Pieces development:

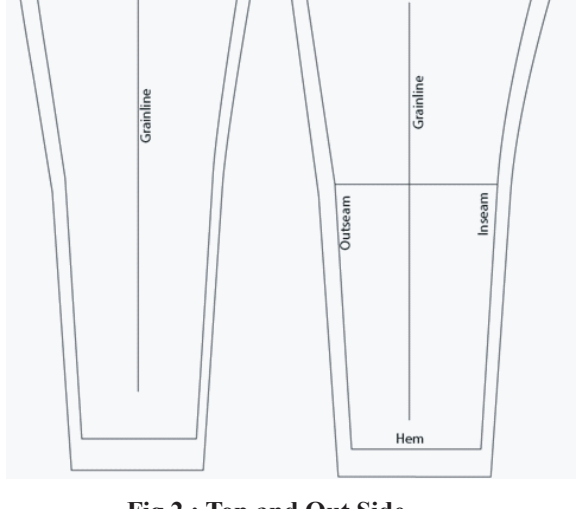


Fig 2 : Top and Out Side

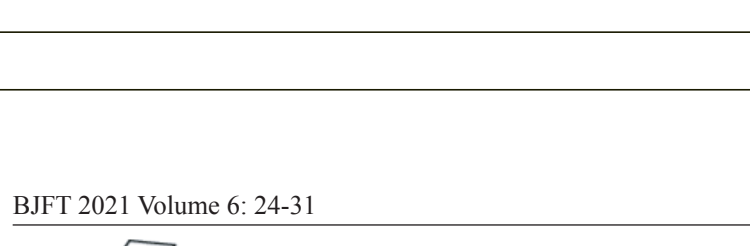


Fig 3 : Front Pocket

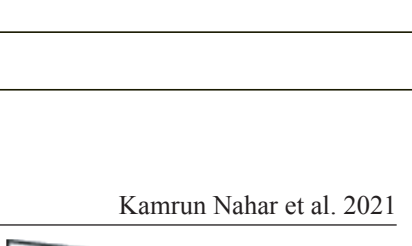


Fig 4 : Front

5. Importance of these methods

Pattern making converts a sketch or measurement chart into a garment hence it's a link between the look and production. Some major elements are discussed below-

5.1 Interpretation: This is often the flexibility to read and understand the look, sketch, or measurement chart and its objective, technical challenges will be resolved by a technician by using these methods and achieving his/her goals.

5.2 Technique: The pattern maker should have an outsized set of tools. A right selection of tools and knowledge of pattern-making methods helps to attain results. To a large extent, the efficient and fruitful customized production of a garment relies upon the accurate idea of those methods. Technological facts are interpreted into pattern making. One (pattern maker) should have the mindset and may understand appropriate methods for the implementation of every detail within the relevant pattern.

5.3 Prerequisite: For pattern making, knowledge of basic geometry may be a must, because pattern making is predicated on logic and mathematical calculation whether it's done manually or by using the software.

The garment industry is all about pattern cutting and design. Patterns provide information about the right style and accurate measurements of garments. In addition to providing clear information about construction, sewing allowances, grain lines, fabric cutting directions, and eliminating fabrics waste, a correct pattern can also help produce an appropriate sample. Based on the pattern, the factory can estimate the resources needed for a particular style of garment and thus get more orders from buyers in bulk production. Pre-production issues can be minimized with more accurate interpretation and the use of appropriate techniques, enabling trouble-free shipment to the buyer

6. Outcomes

6.1 Easy creation and less time consumption: Garments and the textile industry continuously process large volumes of orders. It is necessary to create patterns for every garment. Depending on the order quantity, these methods are easier and quicker ways to create patterns for trousers, and also less time-consuming.

6.2 Minimal Error: Patterns are the center of clothing production. Creating trousers patterns for clothing production may be a skilled practice. Every pattern is designed in detail and the appropriate processes to ensure each garment is made to specification with the least amount of error possible.

6.3 Accurate fit: Garment fit is vital for the user. a pleasant design, costly fabric, and other features of the garment are of no use if the fit is poor. A well-fitted garment looks better and is more comfortable; on the contrary, a garment with a poor fit won't be used and perhaps not even sold. This process allows you to get the correct fit of trousers.

7. Results and discussion

For trousers pattern development, the major measurements of the body are waist and hip circumferences, as well as hip and crotch lengths. Also, the quantity and position of darts were influenced by the final shape and comfortability of trousers. There are distinct allowances at the waist and hip in all pattern-making processes, and the placement and amount of darts also differ. The additional allowance for waist and hip results from the degree of overhanging parts on the front and back and impacts the suitability of movement. Darts in trousers are positioned at the parts which have the longest distance between waist circumference and the circumference of the door of the garment. The dart of the front waist was positioned at the front centerline instead of the middle out seams and centerline. The back waist dart was located within the middle of the rear waistline, and the back waist darts were positioned at the purpose of the rear waistline.

8. Conclusion

A tiny deviation in any data can result in the rejection of a garment during the pattern-making process of the garments manufacturing cycle. A simple format for the pattern-making process described here can make the whole process safe and almost accurate to the desired measurements. Particular body sizes and types of subjects were assessed for suitability and applicability. Based on the results mentioned earlier, the following significant findings can be derived from this study.

Firstly, the subject body measurement sizes exceeded the average body size, and body type is not classified into the average division. It is implied that specific body types outside of the average must be considered.

Furthermore, each basic trouser pattern was constructed with the same theoretical construction method. However, the slight differences in construction method and allowance amounts affected the fitting and overall shape of the clothing.

Therefore, it may be time for a new method of pattern-making to be developed. Further, a deeper understanding of these methods should be acquired for people of different ages and ethnicities to develop an optimum pattern that is not time-consuming and will satisfy the majority of customers.

Reference:

M. P. Londrigan, Menswear. Business to style. *New York: Fairchild Books,* 2009, p. 443.

M.L.Gavenas. The fairchild encyclopedia of menswear. *New York: Fairchild Books*, 2008, p. 419.

B. Roetzel, Gentleman. A timeless guide to fashion. *London: Thames and Hudson Ltd.*

H. Eberle, M. Hornberger, R. Kupke, A.Moll, H.Hermeling, R. Kilgus, D. Menzer, W. Ring, Clothing Technology. From fibre to fashion, *Fifth edition, Haan-Gruiten: Europa- Lehrmittel,* 2008, p. 243.