A Study on Laddering Effect Embedded in Fully Fashioned Knitwear Using Polyester Yarn

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Abstract

Fully fashioned Knitwear is the most common apparel for cold countries. We can produce versatile fashions in fully fashioned knitwear by changing machine set ups. Since people are increasingly looking for new and appealing fashions, we are to invent new and attractive designs by changing garment color, shape, line, balance, manufacturing process etc. In this research project, we have tried to bring a newly developed design on fully fashioned knitwear by introducing a laddering effect using polyester yarn. This design has been produced to increase aesthetic value of the garment to catch the attention of fashion conscious consumers.

Keywords: Polyester; Laddering; Fully Fashioned Knitwear; Aesthetic etc.

1. Introduction

In cold countries, people wear warm clothes to protect their body from adverse climatic conditions, e.g. extreme coldness. So they wear sweater, pull over, cardigan, hoody, jacket etc [1]. A garment also accentuates ones personality through the choice of appropriate apparels. At the same time, comfort is also a vital point since he has to wear this garment for hours. Now-a- days people are more conscious about their fashion also. This fashion can be expressed easily with dresses. Sweaters are a common item worn by male, female, adults and kids often over a shirt, blouse, t-shirt or other tops but sometimes next to the skin also.

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Variable design is coming continuously because of its fashion demand like as cable, diamond, pineapple, pointal stich, half cardigan, full cardigan etc. Sweaters are produced directly from yarn in V-bed and Jacquard machines. Mostly used yarns are wool, acrylic, cotton, cashmere, Chenille, angora etc [2].

 In this research, we produced a sweater by using 100% polyester yarn. Here we have taken the concept of our design from a stitching fault named laddering. Many faults or defects may become a design like as slub, drop yarn, needle drop etc [3]. We have also developed a design from a fault. We worked with a fault called needle drop or laddering. This defect caused by the broken needles show prominently as vertical lines parallel to the wales. There are no loops formed in the wales which have a broken needle. And this design looks like a ladder that's why we call it laddering. In our survey we didn't found any sweater which makes with polyester yarn. That's why we thinking that we will make a sweater with polyester yarn. We want to create a new design with a new concept. We choose that yarn because it has more strength from acrylic, soft, more spun capability from cotton & acrylic [4]. And most important thing that there is no sweater in market which is made by polyester yarn till now. After finalize our yarn we have to think about design. We also want to bring a new design in our sweater. Then we search for new concept. Our instructor helps us lot about that. He told us to think about faults. Then we finally find our design "Laddering'.

2. Literature review & theoretical background

In 2002 J. Marsha Michler specified 'Dropped Stich' as a special design and a new concept at her book "Design and Knit the Sweater of Your Dreams". She couldn't specify how it creates and how to apply this design. She just wrote "Drop a stitch off the needle and ravel it to the bottom of the knitting." She also said about various types of design Popcorn, Wrapped stitches, Bobble, Right twist and Elongated stitches [5].

Julie Carles and Jordana Jacobes bring a new era in knitting industry. They told "knitting is not just a cold weather activity anymore-it is a relaxing, meditative hobby that you can have fun doing in any type of weather." They give a concept to makes the design comfortable in both summer and winter season [6].

In 2005, beautiful and historic African carpets, baskets and other fiber and textile arts inspired Danish designer Marianne Isager to create these 16 sophisticated hand knitting sweaters. The knitting techniques including interlace, double knitting, intarsia, domino and Fair Isle are used in traditional and contemporary ways [7].

In 2008, Margaret Hubert did research about men's sweater. He found that like the little touches that make a sweater special, such as an intricate design, a different collar, zipper closings, and pockets. They also like a slightly different take on a classic style. Some men love crew necks, others love V-necks [8].

3. Methodology

There are two types of machine in v-bed, one is jacquard which is run by programing and other is manual (hand driven machine). We use manual hand driven machine to make this design. There are different types of manual hand driven machine on the base of gauges. Gauge means needles per inch. On the base of gauge there are two types of category. One is finer gauge & other is courser gauge. 3 & 5 gauge machines are coarser gauge and 7,

12 & 14 are finer gauges. We use 7-gauge machine to produce our sweater. At first we were trying with 3 and 5 gauge machines but there were some problems to make the laddering because for these two gauges the difference between two neighboring needles are larger than 7 gauge machine. The loops could not catch between two other side needles of dropped needle. The machine jammed. But when we used 7 gauge machine, it ran smoothly and created the design. The needle we used is known as "Latch Needle" [9].

4. Result & Discussion

At first we used polyester filaments but the design looked very fluffy and wavy. Then we started thinking to use another suitable yarn. Then we used 100% polyester 50/2 spun yarn which was treated by softener & lacrosse. It increases smooth surface and increases spun capability of yarn. In 7 gauge machine we had to use 8 cones of yarn because of yarn thickness.

After selecting yarn, we firstly decided to do it in 7 gauge machine. After producing a swatch we saw the laddering design was not so good. It was tiny. From a longer distance, the design was not clearly visible.

So we started thinking to do it in 5 gauge machine. After making swatches, we saw it looked better than 7 gauge. Finally we decided to do it on 5 gauge machine. Then we took proper body measurement and make a design chart to know how many needles are needed. At first we take 40 needles and then did 30 courses to make a swatch. Then we take measurement to know how many courses are needed to complete entire sweater.

Table 1: Measurement Chart

Body length	26″
Chest	16″
Sleeve length	20″
Across shoulder	13″
Arm hole	8″
Neck width	5″
Bicep	7″(D)
Cuff opening	3.5″(D)

Body Part:

In swatches there are 40 needles in 4.5″.

So, WPI= 40/4.5″= 8.9

And there is 31 c/s between 7.5″

So, CPI= 30/7.5″= 4.13

Total needle needed to bottom = WPI*Body Length

$$= 8.9*26″$$

$$= 143.4$$

$$= 144 \text{ needles}$$

For bottom rib (1×1),

There are 10 c/s between 1.7″

So, bottom CPI= 10/1.6″

$$= 6.18$$

Total c/s needed for rib height = 2.5*6.18

$$= 15.45 \approx 16 \text{ c/s}$$

Total no. of C/S without rib height = CPI*(Length - rib height)

$$= 4.13*(26-2.5)$$

$$= 97 \text{ c/s}$$

For decreasing,

No. of c/s = (Arm hole-3″)*CPI

$$= (8″-3″)*4.13$$

$$= 20.65 \approx 21$$

$$= 21 \text{ c/s}$$

Before selecting how many needles will be decreased, we have to know how many inches should be decreased between chest and across shoulder.

$$= \text{Chest} – \text{Across shoulder}$$

$$= 16″- 13″$$

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$$= 3''$$

So, needle need to be decreased,

$$= 3'' * \text{WPI}$$

$$= 3'' * 8.9$$

$$= 26.7/2$$

$$= 13.35 \approx 14$$

$$= 14 \text{ needles (for one side)}$$

We are to divide it by 2 because we have to decrease both sides of the shoulder.

We know the formula, how many needles will be decreased after how many courses is,

$$= \frac{\text{No. of c/s}}{\text{No. of needles}}$$

$$=\ \frac{21}{14\ \lfloor\ 21\ \rfloor\ 1}$$
$$\frac{14}{7}$$

Now at first, 1 needle will be decreased after 1 c/s till 7 times.

$$1 - 1 = 7 \ (: 14\text{-}7)$$

After that, C/S remaining, $= 21\text{-}(7*1)$

$$= 14 \text{ c/s}$$

Needles remaining $= 14\text{-} (7*1)$

$$= 7 \text{ needles}$$

Again,

$$
\begin{array}{r|c|c}
 & 14 & \\
\hline
7 & 14 & 2 \\
 & 14 & \\
\hline
 & 0 &
\end{array}
$$

Now, secondly 1 needle will be decreased after 2 c/s till 7 times.

$$2 - 1 = 2 \ (:7\text{-}0)$$

After decreasing we have to make c/s in straight about 3″.

So now C/S needed,

$$= 3″ * CPI$$

$$= 3″ * 4.13$$

$$= 12.39 \approx 13$$

$$= 13 \text{ c/s}$$

For neck hole,

$$= (\text{Shoulder} - \text{Neck width})/2$$

$$= (13\text{-}5)/2$$

$$= 4″ \text{ (for one side)}$$

Then neck hole will be after,

$$= 4″ * WPI$$

$$= 4″ * 8.9$$

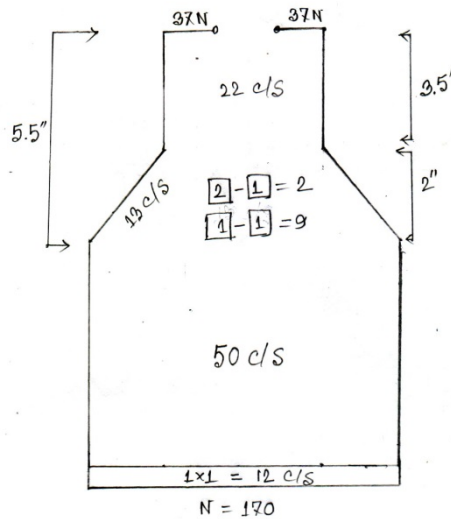$$= 35.6 \approx 36$$

$$= 36 \text{ needles (for one side)}$$

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Figure 2: Design Chart-Body part

Sleeve Part:

Needle needed in bottom = Cuff length*WPI

$$= (3.5''*2)* 8.9$$

$$= 62.3 \approx 63$$

$$= 63 \text{ needles}$$

In bicep needle needed, $= (7*2)*8.9$

$$= 14*8.9$$

$$= 124.6 \approx 125$$

$$= 125$$

Needle needed to be increase $= 125-63$

$$= 62/2$$

$$= 31 \text{ needles (for one side)}$$

No. of c/s, for rib,

$$= 3''* \text{CPI}$$

$$= 3'' * 4.13$$

$$= 12.4 \approx 13$$

$$= 13 \text{ c/s}$$

No. of c/s,

$$= 11'' * \text{CPI}$$

$$= 11'' * 4.13$$

$$= 45.43 \approx 46$$

$$= 46 \text{ c/s} + 10 \text{ c/s}$$

$$= 56 \text{ c/s}$$

Again, we know the formula how many needles will be decreased/increased after how many courses is,

$$= \frac{\text{No. of c/s}}{\text{No. of needles}}$$

$$= \frac{56}{\begin{array}{r} 31 \overline{\smash{\big)}\, 56} \, \big(\, 1 \\ \underline{31} \\ 25 \end{array}}$$

Now at first, 1 needle will increase after 1 c/s till 6 times.

$$1 + 1 = 6 \ (: 31\text{-}25)$$

After that, C/S remaining, $= 56\text{-}(6*1)$

$$= 50 \text{ c/s}$$

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Needles remaining = 31- (6*1)

$$= 25 \text{ needles}$$

Again,

$$= \quad \frac{50}{25 \bigm| 50 \bigm| 2}$$

$$\frac{50}{0}$$

Now, secondly 1 needle will be increased after 2 c/s till 25 times.

$$2 + 1 = 25 \text{ (:25-0)}$$

Now decreasing,

No. of c/s needed = 6″* CPI

$$= 6″* 4.13$$

$$= 24.78 \approx 25$$

$$= 25 \text{ c/s}$$

No. of needle needed to be decrease,

$$= \text{Bicep – Shoulder join}$$

$$= 14″- 10″$$

$$= 4″$$

$$= 4*8.9 \text{ (WPI)}$$

$$= 35.6 \approx 36$$

$$= 36/2$$

$$= 18 \text{ needle (for one side)}$$

Again, we know the formula,

$$= \quad \frac{25}{\begin{array}{c|c|c} 18 & 25 & 1 \\ \hline & 18 & \\ \hline & 7 & \end{array}}$$

Now at first, 1 needle will decrease after 1 c/s till 11 times.

$$1 - 1 = 11 \ (: 18\text{-}7)$$

After that, C/S remaining, $= 25\text{-}(11*1)$

$$= 14 \text{ c/s}$$

Needles remaining $= 18\text{-} (11*1)$

$$= 7 \text{ needles}$$

Again,

$$= \quad \frac{14}{\begin{array}{c|c|c} 7 & 14 & 2 \\ \hline & 14 & \\ \hline & 0 & \end{array}}$$

Now, secondly 1 needle will decrease after 2 c/s till 7 times.
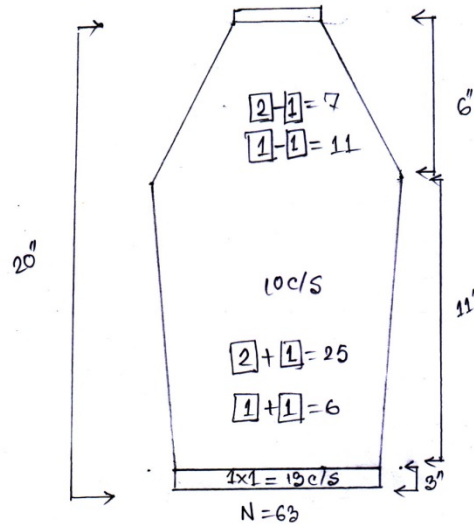
$$2 - 1 = 7 \ (:7\text{-}0)$$

Figure 3: Design Chart-Sleeve part

After completing the body parts, sleeve & neck are joined with it with 6 gauge linking machine and then the linked parts were joined by 3 thread over-lock machine. Some faults like, hole etc. were repaired by mending. Then finally the sweater was produced [10].
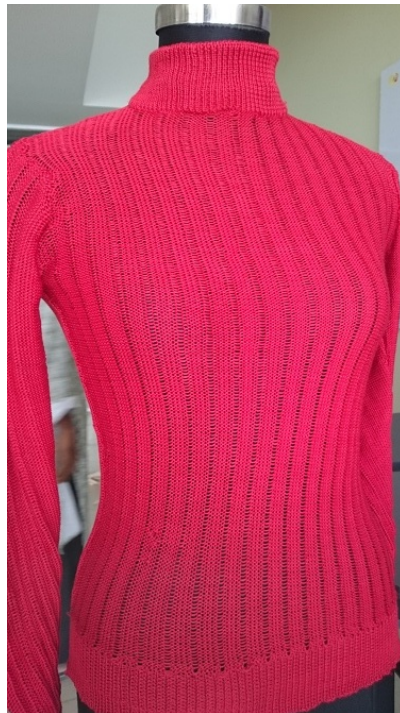

Figure 4: Final Sweater

5. Conclusion

Developing a new apparel design from a concept that is generally considered as a garment fault is a great thing. Many new designs have been produced in recent time following the same idea. Since fashion is changing very rapidly now-a-days, people are taking inspiration for new designs from various new sources. This concept of making fully fashioned knitwear from laddering effect can be reflected in large scale in apparel industry to catch the eyes of consumers.

6. Recommendations

This research result can be applied in the industrial level to produce garments with new and innovative designs. For that development work can be done to verify the feasibility of mass production.

References

[1]   https://www.collinsdictionary.com/dictionary/english/winter-clothes.

[2] Khaled Md. Ridwan, Slideshare

(https://www.slideshare.net/KHALEDRIDWAN/fullyfashionknitwear,Published on 2016)

[3]   Md. Rafiqul Islam Manik, Basics of Garments Merchandising (Rupok Book House, Dhaka, 2015)

[4] Mazeyar Parvinzadeh Gashti and Roozbeh Hajiraissi, Macro- and Microemulsion silicon softeners on polyester fibers: Evaluation of different physical properties, Research Gate, J Surfact Deterg(2008) 11:269-2736.

[5] J. Marsha Michler, Design and Knit the Sweater of Your Dreams (700 East state street, Krause Publications, 2002)

[6] Julie Carles and Jordana Jacobes, The Yarn Girls Guide to Knots for All Season (New York, Potter craft)

[7] Marianne Isager, Knitting out of Africa (201 East fourth street, Interweave Press LLC, 2005)

[8] Margaret Hubert, Knits For Men (400 First avenue north, Creative Publishing International, Inc. 2008)

[9] Shah Alimuzzaman Belal, Understanding Textile for a Merchandiser (Dhaka, BMN foundation)

[10] Shah Alimuzzaman Belal, Understanding Textile for a Merchandiser (Dhaka, BMN foundation, Page-446-487)