MAXIMUM LIMIT OF TUCK LOOP CAN INVOLVE AND MINIMUM NEEDED KNIT LOOP IN ANY DESIGN REPEAT TO CREATE SINGLE JERSEY KNITTED FABRICS

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Abstract

We all know it is very difficult to create a knit fabric design and maintain the entire quality parameters in quality test. When we change the design of the fabric by changing cam and needle, then it becomes more difficult to maintain all those parameters also it needed lots of time. Knit sector is very running sector so there is no time to west or do mistake. In knitting industries fabrics quality and parameters calculation are done mainly based on experience and previous data. They don't have any proper technical formula for knit fabrics from the machine. But they have their own formula and those formulas are difficult to understand by technical and non-technical people working in the industry. Therefore, this work mainly focuses on technical analysis to formulate formula/equations, which will be easy to understand and to use in industries to calculate and control fabrics quality parameter. Here was a little try to find out the formula by real life experience and data for Tuck loop and Knit loop design.

Keywords: Single Jersey Fabric, Knit Loop, Tuck Loop, Design Repeat, Derivatives of Single Jersey Fabric, Maximum Limit of Tuck Loop, Minimum Limit of Knit Loop.
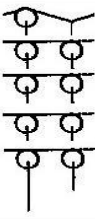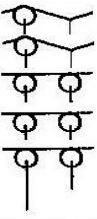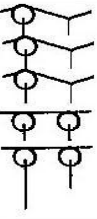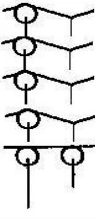
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1. INTRODUCTION

Textile sector is the biggest sector in Bangladesh and it is also the highest foreign currency-earning sector of Bangladesh. Day by day the world of knit garments has become more difficult for the manufacturers. To meet the challenge of this knit garments aggressive world, this paper is a little try to do something new which will help for knit fabric production. This paper is inspired by the first paper "EFFECT OF TUCK LOOP IN BURSTING STRENGTH OF SINGLE JERSEY KNITTED FABRICS". [1] Also followed some other articles like "EFFECT OF WALE WISE INCREASING OF TUCK AND MISS LOOPS ON BURSTING STRENGTH OF SINGLE JERSEY FABRIC AT GREY AND FINISH STATE" [2] and some books.[3] [4] [5] [6] [7]. It will be easy to create design and decorative single jersey fabric by following this paper.
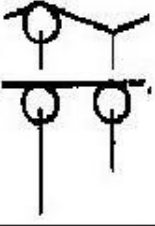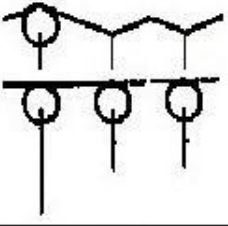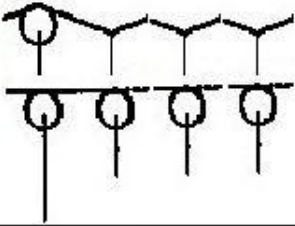
2. MATERIALS AND METHODS

Knit fabric cannot make without knit loop. Knit loop is the base of knitted fabric. Tuck loop and Miss Loop is less stronger then knit loop and they use for design purpose. Use of tuck and miss cams help to produce the derivatives of single jersey. The first attempt was to find out the changes of fabrics in various percentages of tuck cams in a design repeat of s/j fabric and maximum limit of tuck loop can involve in any design repeat. Many factory records and several books were studied to find the logical answer. To have a new idea this paper was a try to do something new. All the answers and data were then checked with large number of factory data. Sixteen times samples were tried for this experiment and they are shown here with their cam arrangement and needle arrangement (Figure 1.A, 1.B, 1.C, 1.D, 2.A, 2.B, 2.C, 3.A, 3.B, 3.C, 3.D, 3.E, 4.A, 4.B, 4.C and 4.D).
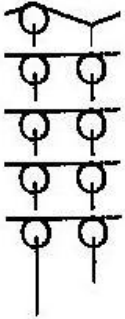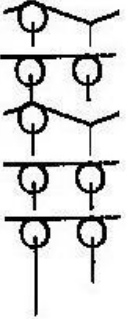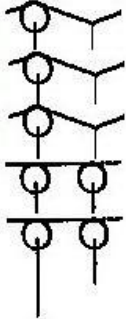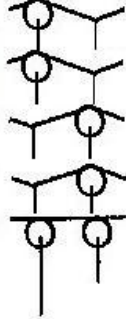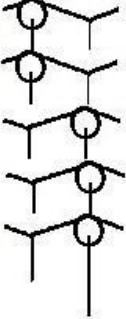
2.1 Use Tuck Loop in same Wales by Maintaining Percentage (%) of the Fabrics. (N.B. 30/s yarn)[1]

Needle Arrangement			
1,2,1,2	1,2,1,2	1,2,1,2	1,2,1,2
Cam Arrangement			
Fig: 1.A (10% Tuck Loop)	Fig: 1.B (20% Tuck Loop)	Fig: 1.C (30% Tuck Loop)	Fig: 1.D (40% Tuck Loop)

2.2 Use Tuck Loop in same Course by Maintaining Percentage (%) of the Fabrics. (N.B. 30/s)[1]
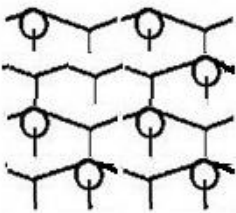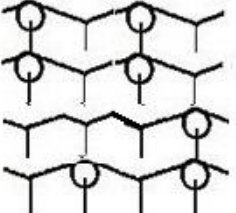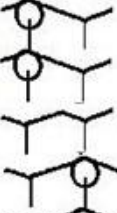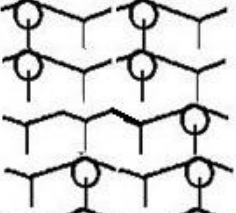
Needle Arrangement		
1,2,1,2	1,2,2,1,2,2	1,2,2,2,1,2,2,2
Cam Arrangement		
Fig: 2.A	**Fig: 2.B**	**Fig: 2.C**
(1-Tuck Loop, 25%)	(2-Tuck Loop, 33.3%)	(3-Tuck Loop, 37%)

2.3 Use Tuck Loop in various Course & Wales to Complete Design by Maintaining Percentage (%). (N.B 40/s yarn)[1]

Needle Arrangement				
1,2,1,2	1,2,1,2	1,2,1,2	1,2,1,2	1,2,1,2
Cam Arrangement				
Fig:3.A (10% Tuck Loop)	**Fig: 3.B** (20% Tuck Loop)	**Fig: 3.C** (30% Tuck Loop)	**Fig: 3.D** (40% Tuck Loop)	**Fig: 3.E** (50% Tuck Loop)

2.4 At this time we tried to find out the maximum no. of tuck loop we can use in s/j fabric.

We have tried to make fabric where tuck loop% is more than 50%. The designs are given bellow-

Needle Arrangement			
1,2,1,2	1,2,1,3	1,2,1,2	1,2,1,3
Cam Arrangement			
Fig: 4.A (56.25% Tuck Loop)	Fig: 4.B (56.25% Tuck Loop)	Fig: 4.C (60% Tuck Loop)	Fig: 4.D (55% Tuck Loop)

2.5 Data Analysis

Table-1: Determination of how much percentage can make signal jersey fabric.

Percentage of tuck loop	Fig. No.	Result
10%	1.A, 3.A	Successfully made fabric.
20%	1.B, 3.B	Successfully made fabric.
25%	2.A	Successfully made fabric.
30%	1.C 3.C	Successfully made fabric.
33.3%	2.B	Successfully made fabric.
37%	2.C	Successfully made fabric.
40%	1.D, 3.D	Successfully made fabric.
50%	3.E	Successfully made fabric.
55%	4.D	Unsuccessful to make fabric.
56.25%	4.A, 4.B	Unsuccessful to make fabric.
60%	4.C	Unsuccessful to make fabric.

Tuck loop percentage is more than 50% in design repeat.

Fig: 5.A

Fig: 5.B

In **fig: 5.A and fig: 5.B** we can see the condition of fabric when we was tried to make fabric which one have tuck loop percentage is more than 50%. In both picture of fabric the - lower portion is below50%, then we change design and tried more than 50%- middle portion and when we was unsuccessful then we change design and reduce tuck Cam from design repeat- upper portion is 50%.

If design was not change immediately then needle could be hampered.

Also tried to make fabric and create design repeat in 2 different ways,
A. One wale fully tuck loop and others are knit loop.
B. One Corse fully tuck loop and others are knit loop.

But in both occasions was unsuccessful to make fabric.
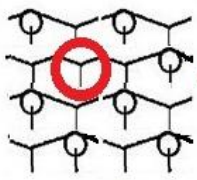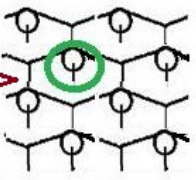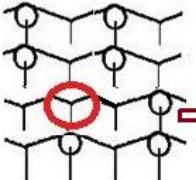
3. EXPLANATION

It was possible to make fabrics which have tuck loop percentage is less than or equal to 50%. That means minimum 50% knit loop needed in any design repeat of a single jersey fabric.

Now we all have similar question, why?

Explanation-1
If we look at **Fig: 4.A** and **Fig: 4.B,** there tuck loop percentage is 56.25%, if we replace one tuck loop by knit loop from that design repeat then in become 50% tuck - 50% knit, now we have to Find out which tuck loop should replace.

	Needle Arrangement		
1,2,1,3	1,2,1,2	1,2,1,3	1,2,1,2
	Cam Arrangement		
Fig: 4.A.1 (56.25% Tuck Loop)	Fig: 4.A.2 (Singal Pique)	Fig: 4.B.1 (56.25% Tuck Loop)	Fig: 4.B.2 (Double Pique)

In **Fig: 4.A.1, Fig: 4.B.1, Fig: 4.C.1** and **Fig: 4.D.1** we have tried to show that. Here we can see the red circles (**4.A.1, 4.C.1**) are tuck loop which one replaced into knit loop in green circles (**4.B.1, 4.D.1**). Here we see a big difference, those two designs converted into single pique and double pique.

Than we collected some designs to find out causes from several books and journals like-

1. Understanding Textile for a Merchandiser. (Engr. Shah AlimuzzamanBelal)[4]
2. Circular Knitting. (Mammel)[5]
3. Knitting Fundamental, Machine, Structure & Developments. (N.Anbumani)[6]
4. Knitting Technology. (David J Spencer)[7]
5. Rashed1, Md. Mahamudul Islam2; EFFECT OF TUCK LOOP IN BURSTING STRENGTH OF SINGLE JERSEY KNITTED FABRICS; IJRET: International Journal of Research in Engineering and Technology ISSN: 2319-1163 | pISSN: 2321-7308, Volume: 03 Issue: 05 | May-2014[1]
6. Md. Azharul Islam1; EFFECT OF WALE WISE INCREASING OF TUCK AND MISS LOOPS ON BURSTING STRENGTH OF SINGLE JERSEY FABRIC AT GREY AND FINISH STATE; IJRET: International Journal of Research in Engineering and Technology eISSN: 2319-1163 | pISSN: 2321-7308, Volume: 03 Issue: 02 | Feb-2014[2]

We find much design from book and journal, among all the designs we found the highest Tuck loop% is 50% (like Pique design).

Explanation-2
Now if we concentrate on the notation diagram of all design repeat then we find that in every design which have over 50% tuck loop have 6 tuck loops one after one in the shape of **L** or + or **T** type.

Explanation-3
Here arise another question, In L or + or T shape have 5 tuck loop but how it have 6 tuck loop?
When we see all three shapes we find out that in horizontal direction 3 tuck loops and in vertical direction 3 tuck loop. Now we can decorate like 2/4 also but result will be same again.

Fig: 6.A
(56.25% Tuck Loop)

Fig: 6.B
(56.25% Tuck Loop)

Fig: 6.C
(60% Tuck Loop)

Fig: 6.D
(55% Tuck Loop)
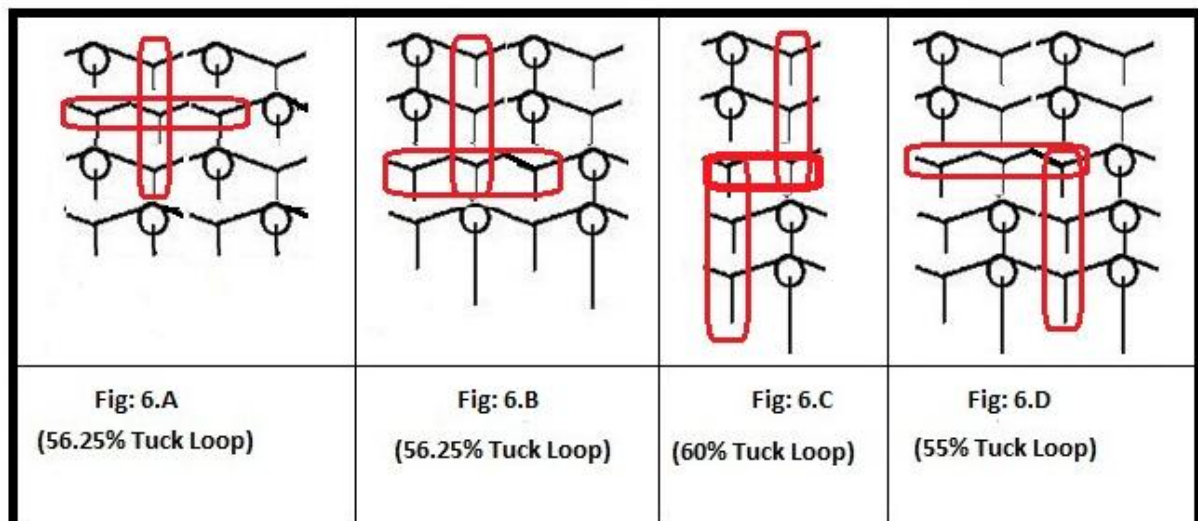
Engr. Shah AlimuzzamanBelal find out "Dependent upon structural fineness, tucking over six adjacent needles is usually the maximum unit before snagging become a problem."[3] So we can say maximum 6 tuck loop we can use one after one in a Course or Wales in a design repeat, But there tuck loop percentage should be less than 50% otherwise we cannot make signal jersey fabric. In Fig: 6.A, 6.B, 6.C, and 6.D we have tried to show that in red circle.

Explanation-4
when tuck loop increases in any design repeat then bursting strength decreases[1] but now in practical, when tuck loop increases more than 50% then it is not matter of bursting strength, then it became difficult to make fabric(Table-1). So 50% is the maximum limit for tuck loop in any design repeat of single jersey knitted fabric.

4. RESULTS

The result for some knitting parameters of circular knitted fabric are-

A. Maximum tuck loop we can use in any design repeat is 50%. Because more than 50% tuck loop design fabric is not easy to make also there was no design exist which have more than 50% tuck loop in any design repeat for single jersey knitted fabric.
B. Minimum 50% knit loop is needed in any design repeat to create any single jersey knitted fabric. Because knit loop is the base of knitted fabric, miss and tuck loop use for decorative purpose.
C. Maximum 6 tuck loop we can use in any design repeat one after one decoration but there knit loop % should be more than 50%.
D. When we use tuck loop in the shape of **L** or + or **T** in any design repeat, then knit loop % should be more than 50%.
E. Presence of knit loop is must need in every Corse and Wales in any design repeat.

5. CONCLUSION

All the equation derived here got some specific variables; some where we are unable to get precise result. It is really so difficult to get sample with variable tuck loop% to keep all of the other parameter constant. The world of knit garments has become more difficult for the producer. So the situation demands some new research and analysis to produce knit fabrics by proper technique which will save time.

After the experiment we can come to the following conclusion-

A. Maximum tuck loop we can use in any design repeat is 50%.

B. Minimum 50% knit loop is needed in any design repeat to create any single jersey knitted fabric.

C. Maximum 6 tuck loop we can use in any design repeat one after one decoration but there knit loop % should be more than 50%.

D. When we use tuck loop in the shape of **L** or + or **T** in any design repeat, then knit loop % should be more than 50%.

E. Presence of knit loop is must need in every Corse and Wales in any design repeat.

6. ACKNOWLEDGEMENTS

7. REFERANCE

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BIOGRAPHIES

Rashed completed his graduation in **B.Sc in Textile Engineering** from **Southeast University**. His interest area in textile sector is fabric manufacturing technology. He has technical experience and currently working as **Research & Developer at Apex Spinning & Knitting Mills Ltd, (Apex holdings Ltd.)** in Bangladesh. He studied the variations of fabrics due to tuck loop in fabric design repeat.
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