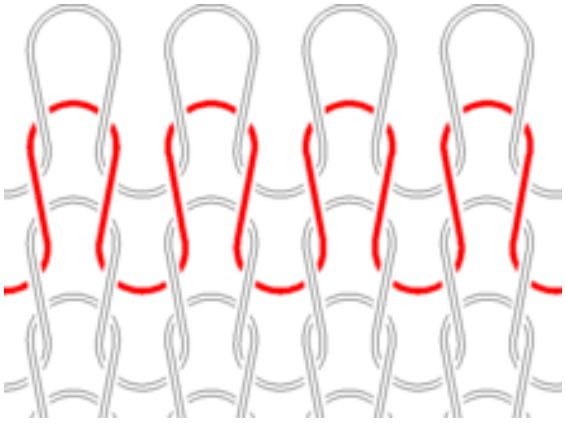
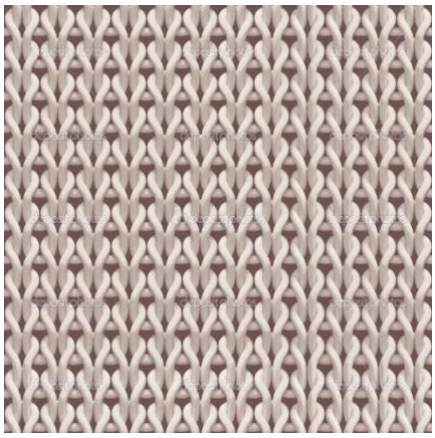
SCS *SPIRALITY CORRECTION SYSTEM*

INTRODUCTION

Circular knitting is employed to produce different type of fabrics such as single jersey, rib, interlock, two-thread fleece, three-thread fleece, terry fabric etc.

Manufacturing of knitted fabrics involves intermeshing of yarn loops where one loop is drawn through another loop to form a stitch.





The single jersey knitted structures, used widely in knitted garments, has a particularly serious problem for plain knitted fabrics due to asymmetric loops.

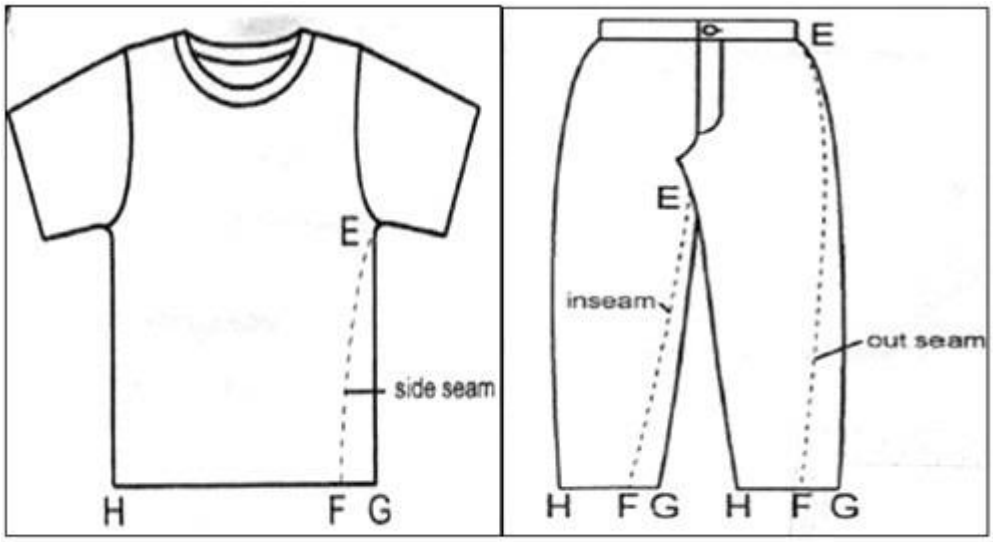
The most important problem of tubular knitted fabric as it is being withdrawn from a circular knitting machine and especially of the single jersey structure is the remaining twist due to the fabric spirality.

The spirality phenomenon concerns essentially unbalanced structures such as single jersey fabrics.
It does not appear in interlock and rib knits because the wale on the face is counter balanced by a wale on the back.
Spirality can be defined as a fabric condition resulting when the knitted wales and courses are angularly displaced from that ideal perpendicular angle.

It occurs in knitted fabric because of asymmetric loops which turns in the wales and course of a fabric into an angular relationship other than 90 degree.

It may exist in grey, washed or finished state and presents a serious problem during garment confection and use.

Some of the practical problems arising out of the loop spirality in knitted garments are: mismatched patterns, sewing difficulties, displacement or shifting of side seams to the back and front of the body, garment distortion and inclined lines at striped fabrics.

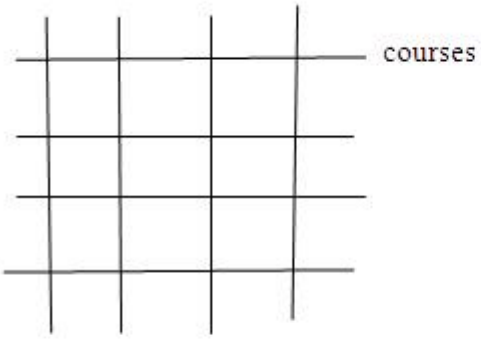


Measurement of tops Measurement of bottoms

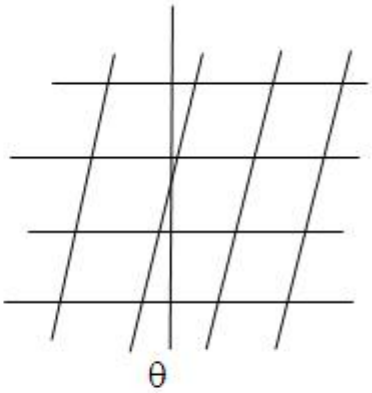
The main problem of the fabrics is that you do not know exactly what the natural distortion of the fabric is. This must be determined by a tumbler test.

This displacement of the courses and wales can be expressed as a percentage or as an angle measurement in degrees.

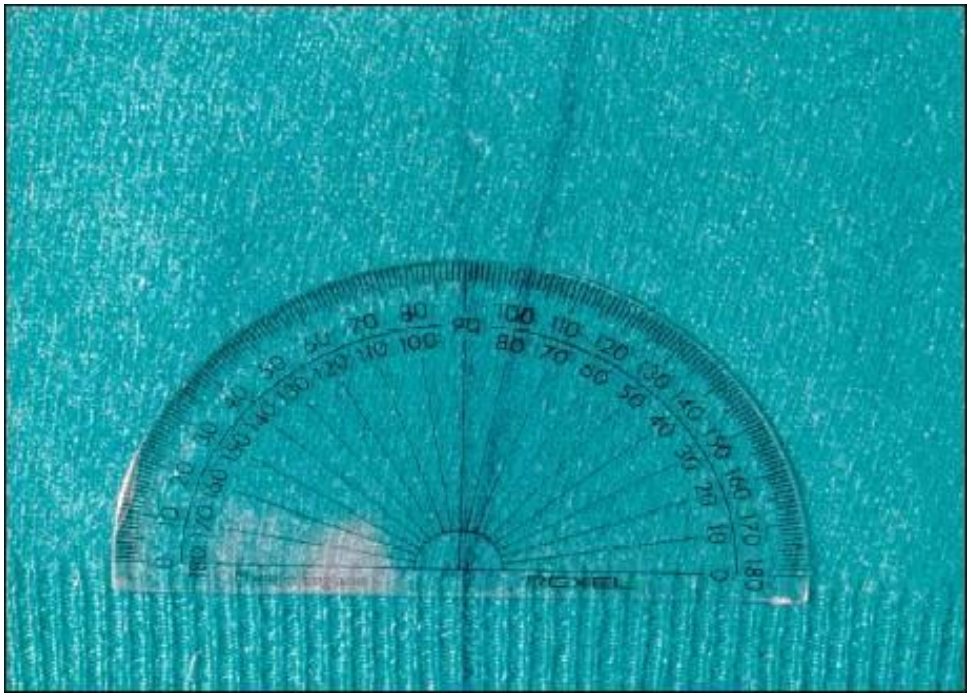
Angle measurement



Fabric with normal loop position



Fabric with spirality



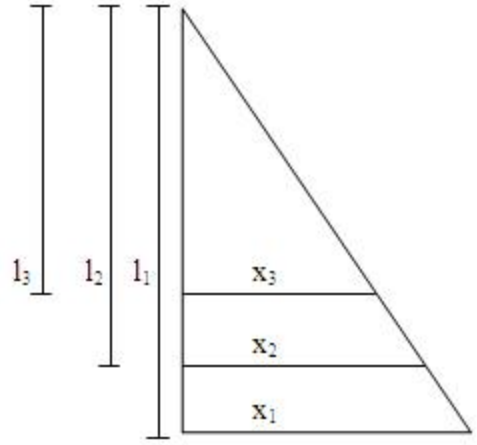
Spirality measured in percentage.

Fabric was cut from the roll at the measurement of (50cm x 50cm). Three sides are stitched. Then the stitched fabric pieces were washed with detergent for an hour and then those were dried in tumble dryer. After conditioning half an hour in the lab temperature, the spirality of the fabrics were measured.

For measuring the spirality, at first the displacement of the wales must be measured, then the length of the wales was taken from the displaced point to the top of the fabric piece.

x = displacement of the wales.

l = Perpendicular length of the wales from the point of displacement to the top of the fabric.



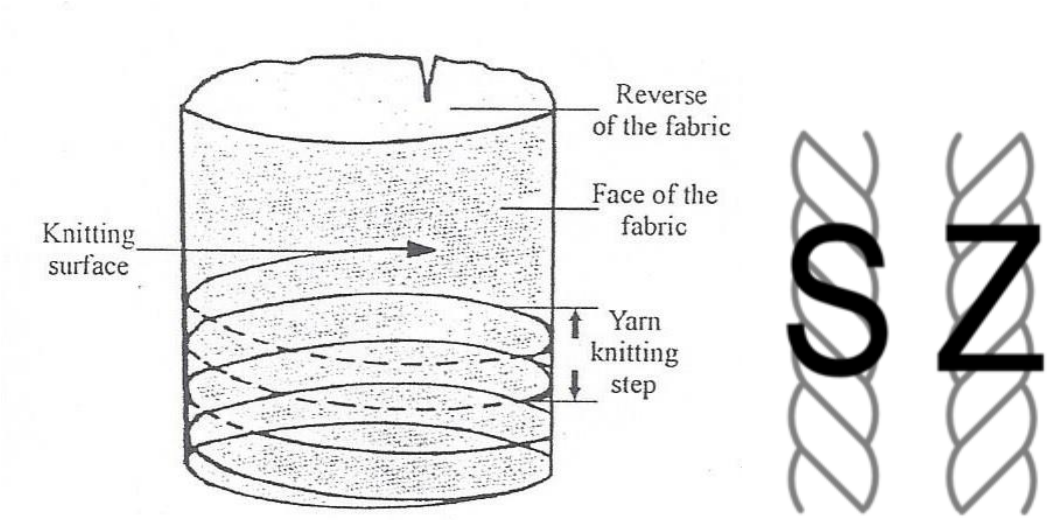
Spirality % = $x_1/l_1 \times 100 = x_2/l_2 \times 100 = x_3/l_3 \times 100$

Parameters that influence spirality.

- The main source of spirality is yarn twist.

When a twisted yarn is knitted into a loop, it will have a tendency to rotate inside the fabric in order to release its torsional strain during relaxation. Unset yarns under low tensile loads have a tendency to return to their untwisted state.

- Spirality depends on feed density, machine cut, and loop shape, but the magnitude of spirality can be offset by the selection of yarn twist direction. In addition, reduction in yam "torque" can only partially reduce fabric spirality.



- The right use of Z and S twist yarns is essential.

Z-twist yarns make the wales go to the right, giving a Z-skew, and S-twist yarns make the wales go to the left, giving an S-skew to the fabric. In order to minimize spirality, Z-twist yarns should be knitted on machines that rotate clockwise and S-twist yarns should be knitted on machines that rotate counterclockwise.

- The number of feeders in a circular knitting machine influences the spirality angle.

Spirality increases strongly when increasing the number of working feeders on the machine. The observed increase of fabric spirality with the number of knitting feeders at a constant machine diameter is due to the nature of weft circular knitting.

- The degree of fabric spirality increases linearly with stitch length.

Stitch length expresses the tightness of knitting construction. The fabric is as tight as stitch length is low. The observed proportionality between fabric spirality and stitch length can be explained by the fact that compared to tight fabrics, slack fabrics have higher stitch length and then the yarn composing the loop has a higher tendency to rotate inside the fabric after relaxation. This phenomenon was explained in terms of the ease of freedom of the loop movement in knitted fabric construction. In a more tightly knitted fabric, the movement of a knitted loop is restricted, and thus spirality is reduced.

- Spirality also depends on textile dyeing and finishing process.

After wet processing in rope form, the tubular fabric is collapsed and badly twisted.

During drying process in relax dryer machines, the fabric is relaxed and the spirality increases.

Conclusion

The control of fabric spirality is a team effort. A knitter contributes by the choice of yarn and stitch length, and a finisher can contribute by the method of finishing he may choose to adopt.

Finishing reduces fabric spirality but a residual spirality angle always remains. Generally a spirality angle under 4° is tolerated before garment confection. As per the experience of world renowned retailers in the globe, seam twisting / shape distortion / spirality greater than 6% in tops and shorts and 4% in skirts, pants, dresses, and sleepwear detracts from the appearance of the garment.

Until today It was very important to reduce fabric spirality from knitting process in order to make spirality correction during finishing possible.

The new SCS system reduces the remaining spirality to less than 4% working at the final finishing process prior to the packaging. This means that there is absolutely no way for the fabric to return to its previous twisted state.

The big advantage of SCS system is that works efficiently regardless of all the parameters that influence the spirality from knitting process to dyeing and finishing process.

SCS

SPIRALITY CORRECTION SYSTEM (Patented) is a machine made for controlling the remaining twist of the tubular knitted fabric.

It is fully automatic and makes the correction easy, regardless of all the parameters that influence the spirality of tubular knitted fabric. The remaining spirality after processing is less than 4%.

It is set at the entrance of a compactor or a calender machine, working with automatic synchronization at the final operation prior to the packaging, reducing the processing time and cost.

The only needed data for input are the percentage of the spirality, the width of the fabric and the direction of rotation.

The process is fully automated controlled by a PLC. The program can control the degree and direction of twist imparted by speeding up, slowing down, stopping the motor, or changing the direction of rotation.

The materials used for the construction of the mechanism are suitable for very little friction required to impart or retard twist to the traveling fabric. Therefore, such relatively smooth surfaces can provide sufficient friction for proper operation and do not snag or otherwise damage the finished product.

A safety shut-off device is also installed to prevent damage to the detwisting mechanism and/or to the fabric, if a large hole in the fabric is detected.

Specifications:

Working width:	410 mm - 1250 mm
Speed:	10-120 m/min
Power:	2 KW
Driving method:	Frequency inverters
Detwisting method:	Automatic
Fabric input:	Flat form
Fabric output:	Flat form

Dimension

Total Length:	4000 mm
Total Width:	2000 mm