PREVENTION OF BARRE

As discussed in the text, barré is caused by inconsistencies in materials, equipment, or processing. To prevent barré from occurring, consistency must be maintained through all phases of textile production. Stock yarns should be properly and carefully labeled to avoid mix-ups. Fugitive tints and/or marked cones can be useful for accurate yarn segregation.

Inventory should be controlled on a first in/first out basis. All equipment should be properly maintained and periodically checked. In spinning and knitting before beginning full-scale production, sample dyeings can be done to check for barré. Knit machine operators should be trained to look for barré as it occurs in the greige. If spotted, the machine should be stopped until the cause is eliminated.

Salvaging a fabric lot with a barré problem may be possible through careful dye selection. Color differences can be masked by using shades with very low light reflectance (navy blue, black) or high light reflectance (light yellow, orange, or finished white).

Dye suppliers should be able to offer assistance in this area. Also, if the cause of the barré is an uneven distribution of oil or wax, a more thorough preparation of the fabric before dyeing may result in more uniform dye coverage.

With close cooperation between production and quality control personnel, barré problems can be successfully analyzed and solved. Recommendations to minimize barré include:

! Knit an entire dye lot from the same knitting machine.
! Use only yarn from the same spinning lot.
! Use only from the same shipment date if possible.
! If yarn shipment dates must be mixed, then use consecutive shipment dates.
! Determine through laboratory analysis and experience if the preparation procedures are sufficient or can they be modified to eliminate the problem.
! Determine if some shades and dyestuffs are less susceptible to showing barré, and apply those to problem fabrics.
! Make use of yarn/fabric analysis systems such as CYROS®.
! Identify those rolls within a dye lot that have mixed yarn shipment dates so that it is known when the fabrics go through the dyehouse.
! Identify dye lots that have rolls from different yarn shipments before dyeing.

BARRE IN FABRICS

INTRODUCTION

In textile industry, one of the most common and perplexing quality control problems is barre (repetitive yarn direction streaks). The factors which can cause or contribute to barre are varied and diverse.

Barre is defined as "unintentional, repetitive visual pattern of continuous bars or stripes usually parallel to the filling of woven fabric or to the courses of circular knit fabric."

Barre is sometimes used as a synonym for WARP STREAKS.

Barre can be caused by physical, optical or dye differences in the yarns, geometric differences in the fabric structure or by any combination of these differences.

Barre is basically a visual phenomenon and any property of yarn which makes it 'look' different from the adjacent yarn in a fabric would result in this defect.

Barre can be due to the following

fibre properties

yarn characteristics

knitting parameters

In weft knit fabrics Barre is taken to include only those fabric defects charecterised by course wise (widthwise) repearing bars or stripes. In warp knits, the warp (or length) direction. This is symptomatic of the way in which the fabrics are produced.

CAUSES OF BARRE

All barre is the consequence of subtle differences in yarn reflectance between individual yarn in the knit structure. Any mechanism that can change the reflectance of a yarn in a knit structure is a potential barre source. Barre can be caused by physical, optical, or dye differences in the yarns, geometric differences in the fabric structure, or by any combination of these differences. A barre streak can be one course or end wide or it can be several - a "shadow band"

It is not the inadequacy of the raw material property which results in Barre, It is the inconsistency or the variability of the particular property which results in Barre.

The properties which are the causes of Barre are given below.

1. Fibre Micronaire variation

2. Fibre color variation
3. Yarn linear density variation
4. Yarn twist variation
5. yarn hairiness variation
6. knitting tension variation
7. improper mixing of cotton from different origin
8. improper mixing of cotton from different varieties
9. improper mixing of cotton grown in different seasons

Zellweger Uster has published the following details regarding Barre

causes	% ge of defect
fibre	70
yarn count variation	10
twist variation	10
hairiness	10

Micronaire: The difference in Micronaire average of the mixings of the entire lot should not be more than 0.2 The range of the Micronaire of the individual bales used in the mixings should be same the C.V.% of Micronaire of individual bales within the mixing should be less than 12 % Same micronaire bales should not be placed side by side and a group should be formed with the different micronaire bales and it should be repeated in the bale laydown David M. Clapp 5 , of Cotton Incorporated demonstrated that as the difference in micronaire value increases, the intensity of the barre effect becomes more serious. In the process, he observed that the cause of barre is not the difference in dye uptake between the thin cell walls of the low micronaire fibres and the thicker cell walls of the high micronaire fibres.He showed that per unit weight, dye exhaustion / fixation is essentially the same for the low micronaire and high micronaire fibres and also illustrated that at high micronairevalues, both the maturity and fineness registered an increase. More importantly, he extended his study and showed that by proper blending of the cottons, the occurrence of barre due to differences of even upto 1.6 micronaire can be eliminated. Fluorescence: The difference in UV reading average of the mixings of the entire lot should be same Variation in UV readings within the bale should be less out side storage of cotton should be avoided UV readings increase over time if it is stored for a long time should not mix high and low UV bales Colour has been one of the primary factors of cotton quality for quite a long time. Colour is particularly important as a measure of how well a yarn or fabric will dye or bleach. Colour in general is expressed in trichromatic terms, such as L, a and b (Reflectance, Redness/greenness and Yellowness / blueness). The significance of these components with regard to cotton has been extensively studied and is generally agreed upon that only reflectance and degree of yellowness are important in assessing cotton colour The influence of cotton colour on the dyeability characteristics of fabrics have been studied and reported by the U.S. Department of Agriculture , which revealed that a significant correlation exists between the colour characteristics of raw cotton and the colour of washed and wash-dyed cotton fabrics. Since much of the barre effects are due to the variations in dyeability characteristics within a fabric, difference in colour properties could be expected to influence the seriousness of any barre incidences in the fabric. Yarn properties: It has been widely accepted that it is the inconsistency or the variation aspect of the yarn properties which is a prime cause for 'Barre" Of the various quality characteristics tested, variation in hairiness count and twist are considered to be three important properties which need proper control to avoid barre. Slippage of spindle tape is the main reason for the TPI variations. If the TPI is more in yarn then the yarn diameter will reduce adn number of helical angle will increase. If the diameter of the yarn is low then more light will pass through that region of cloth because the gap between the two yarn is more.When more ridges are present, then more light reflects from the surface of the yarn. Hence regions with high TPI yarn appear light coloured after dying. knitting: A bar or stripe may be caused by several variables shown below Tight loops: This may take the form of a shaddow (several courses involved) or a discreet line (one course involved). It will normally show up as a dark or dense line or shaddow Slack loop: Similar to above, but it shows up as a sheer or light line. improper stich length at a feed improper tension at a feed variation in fabric take-up from loose to tight Worn needles, which generaly produce length direction streaks Uneven cylinder height needles(wavy barre) Uneven loops: In this the "average" stitch length is the same in all cases but the distribution of the length of yarn between the dial and the cylinder of knitting machine is not balanced on a particular course. Thus it will appear as a tight or slack course on one side but analysis will not show up the fault. Weaving: Uneven warping tension Uneven take-up tension Uneven let-off motion Uneven tension on filling Scuffing or filling yarn on the beam Bent beam gudgeons

VISUAL BARRE ANALYSIS: The first step in Barre investigation is to observe and define the problem. Barre can be the cause of physical causes which can usually be detected, or it can be casued by dyeability differences which may be nearly impossible to isolate in fabric. Barre analysis methods that help to discriminate between physical barre and barre caused by dyeability differences incluede Flat Table Examination, Light source Observation, and the Atlas Streak analyser. FLAT TABLE EXAMINATION: For a visual barre analysis, the first step is to lay a full width fabric sample out on a table and view both sides from various angles. Generally, if the streaky lines run in the yarn direction, color differences can be seen by looking down at the fabric in a direct visual line with the yarn direction, and the defect can be positively identified as a barre defect. Viewing the fabric with a light source in the back ground will show if the barre is physical.

LIGHT SOURCE OBSERVATION: After completing an initial Flat Table Examination, a Light Source Examination may provide further useful information. Full width fabric samples should be examined under two light conditions, fluorescent and ultraviolet (UV) light. Observations that should be made while viewing under lights are: frequency and direction of the barre whether streaks are dark or light and total length of pattern repeat. Ultraviolet light, commonly referred to as a "black light", allows the presence of mineral iols to be more easily detected, due to their radiant energy (glow). When observed under UV light, fabrics with streaks that exhibit glow suggest improper preparation. A change in composition or content of oil/wax by the spinner or knitter without appropriate adjustments in scouring can create this problem.

PHYSICAL BARRE ANALYSIS: When the cause of barre is determined or presumed to be physical in nature, physical fabric analysis should be done. Physical barre causes are generally considered to be those which can be linked to yarn or machine differences. Methods of physical barre analysis include fabric dissection, microscopy, and the Roselon Knit Extension Tester.

FABRIC DISSECTION: To perform accurate fabric dissection analysis, a fabric sample which contains several barre repetitions is required. First, the barre streak boundaries are marked by the placement of straight pins and/or felt markers. Individual yarns are removed from light and dark streak sections, and twist levels, twist direction, and cut length weight determinations are made and recorded. For reliable mean values to be established, data should be collected from at least two light/dark repeats. After compilation of yarn information, the numbers can be compared individually to adjacent yarns as well as by groupings of light and dark shades.

MICROSCOPY: Microscopic examination is useful for verifying yarn spinning systems. Yarns from different spinning systems can have different light reflectance and dye absorption properties. Ring spinnning produces yarn that is smooth. Open end spinning produces yarn with wrapper fibres at irregular intervals. Air jet spinning produces yarn with more wrapper fibres than open end and inner fibres are more paralle. Microscopy can also reveal a shift in loop formation in knitted fabrics when twist direction (S and Z) differences are present. Barre is noticed in a fabric when the visual perception of colour of a particular portion of a fabric is different from that of an adjacent portion. Numerous attempts have been made by research workers to arrive at a mathematical number which gives an equal change when a change in perceptible colour difference exists. Reflectance differences have been considered by many researches to be indication of barre in fabrics. E.R.Cairns, H.A.Davis and J.W.Coryell 5 hypothesised that double knit barre is caused by textured yarn reflectance differences in the knit structure. Depending on the detailed arrangement of these differences, barre is seen as continuous or random and either as single end streaks or bands. Based on studies made with a research grade spectrophotometer, they also found that yarn reflectance differences are caused by differences in key textured yarn properties like bulk, cross section, loop size etc.

PREVENTION OF BARRE: As outlined, Barre is caused by INCONSISTENCIES in materials, equipment, or processing. To prevent Barre form occuring, consistency must be maintained through all phases of textile production. Stock yarns should be properly and carefully labelled to avoid mixups. Fugitive tints can be useful for accurate yarn segregation. Inventory should be controlled on a First In/ First Out basis. All equipement should be properly maintained and periodically checked. Before beginning full scale production, sample dyeings can be done to check for Barre. Salvaging a fabric lot with a Barre problem may be possible through careful dye selection. Color differences can be masked by using shades with very low light reflectance (navy blue, black) or high light reflectance (light yellow, orange, or finished white). Dye suppliers should be able to offer assistance in this area. Also, if the cause of the barre is an uneven distribution of oil or wax, a more thorough preparation of the fabric prior to dyeing may result in more uniform dye coverage. With close cooperation between production and quality control personnel, barre problems can be successfully analysed and solved.

EXPERIMENT: The experiments done by Mr.ANBARASAN of PREMIER POLYTRONICS is given below. FIBRE PROPERTY INFLUENCE ON FABRIC BARRE: EXPERIMENTAL PROCEDURE It was identified that the incidences of fabric barre was more common in knitted fabrics. So one of the most commonly used hosiery counts - 30s Nec Combed Hosiery was chosen for the study. Preparation of basic yarn samples: Preparation of samples with different yarn count: The extent of influence of yarn count was studied by taking into consideration three levels of count. To avoid any abnormal conditions of spinning, one of the levels was maintained at the normal level used by mill for regular production. The other two samples were obtained by spinning counts differing by 2 Nec(6.7%) from the normal. The three count samples of 28, 30 and 32 Nec are designated as A, B and C respectively. The raw material and the process parameters maintained in all departments upto ring spinning were maintained the same for all the three samples. In ring frames, the count change pinion was changed to obtain the required count. All the other process parameters were maintained the same in ring frames as well. Preparation of samples from different micronaire cottons: The samples for studying the influence of fibre micronaire were prepared by spinning yarn from cottons of micronaire values ranging from 3.8 to 4.32. The micronaire values of the samples are given in Table 1 along with their designations. The cottons were obtained by segregating samples of the same cotton variety to avoid influences of other varietal factors.

Serial No.	Sample designation	Micronaire
1	P	3.8
2	Q	3.95
3	R	4.14
4	S	4.32

Table : Micronaire Values of Basic Samples
Cottons with difference in micronaire readings of less than 0.15 were not taken up since 0.15 represented the measurement accuracy of the micronaire instrument. The spinnings were carried out using a miniature spinning system having the following sequential processing stages :
- Carding
- Drawing
- Sliver to Yarn Spinning

About 50gms of cotton was processed from each sample to obtain yarns sufficient for the subsequent knitting process.
Preparation of samples from cotton with different colour levels:
For studying the influence of colour, the parameter 'Degree of yellowness(+b)' provided by the high volume fibre testers was taken as the reference. Five spinnings were carried out with cottons of different +b values. The values are shown below.

Serial No.	Sample	Degree of Yellowness (+b)
1	A1	9.2
2	B1	10.5
3	C1	11.6
4	D1	13.5
5	E1	14.7

Table : Degree of Yellowness (+b) for Basic Samples
The spinnings for these samples were also carried out using the miniature spinning system.
Fabric Preparation
For all the trials to study the influence of count, fibre micronaire and colour, to detect the presence or otherwise of the barre effect, different combination of two levels were selected. The yarn samples were knit into single jersey fabrics on a circular knitting machine with 2.5mm stitch length such that the two different levels of the combination formed alternate portions of the fabric as shown below :Fabric knitted with a combination of yarn samples.
The fabrics were knitted with 48 cones of each of the two levels feeding the machine.
Dyeing
The fabrics for all the combinations were dyed using Procion Blue MR dye of 2.5% concentration. The same batch of dye bath was used to dye all the fabrics pertaining to a particular property in order to eliminate the introduction of any possible errors in the process of dyeing.
RESULTS AND DISCUSSIONS
Influence of Yarn Count
The intensity of the barre effect noticed for the various count combinations in terms of the visual grading are represented in the following table.

combination	count		difference in count	average grade
	1	2		
AB	28	30	2	4.25
BC	30	32	2	4.5
AC	28	32	4	4.75

Table : Influence of Count on Barre Intensity
The table clearly shows that the intensity of barre is more severe as the difference in count levels increases. It can also be noted that even if a count deviation of +2 Nec from the average is present, a grade of more than 4.0 is recorded which indicates a

Influence of Fibre Micronaire:
The four basic yarn samples obtained from cotton with different micronaire values were used to knit fabrics in a total of 6 combinations with the difference in micronaire values ranging from 0.15 to 0.52. The intensity of barre for these combinations are tabulated below in terms of the average visual grade.

Combination	Micronaire value		Difference in Micronaire	Average grade
PQ	3.8	3.95	0.15	3
RS	4.14	4.32	0.18	2
OR	3.95	4.14	0.19	3
PR	3.8	4.14	0.34	2
QS	3.95	4.32	0.37	3
PS	3.8	4.32	0.52	2

Table : Influence of Micronaire on Barre Intensity The table shows that, within the range of micronaire taken-up in the present study, the intensity of Barre remains fairly constant. An important observation is that the intensity of Barre is serious even with a micronaire difference of 0.15. Hence when preparing mixings of single cotton variety, it should be ensured that the difference in average micronaire between successive mixings is less than 0.15. Influence of Fibre Colour: From the basic 5 samples of yarn differing in terms of the 'Degree of Yellowness (+b)', a total of 10 combination of fabrics could be obtained, with the colour difference ranging from 1.1 to 5.2. The details of the samples and the intensity of barre noticed in these samples are tabulated below. Micronaire Value Combination

Serial No	Combination	Degree of Yellowness		difference in +b values	visual grade
1	B1C1	10.5	11.6	1.1	1
2	D1E1	13.5	14.7	1.2	2
3	A1B1	9.2	10.5	1.3	3
4	C1D1	11.6	13.5	1.9	4
5	A1C1	9.2	11.6	2.4	3
6	B1D1	10.5	13.5	3.0	5
7	C1E1	11.6	14.7	3.1	4
8	B1E1	10.5	14.7	4.2	5
9	A1D1	9.2	13.5	4.3	5
10	A1E1	9.2	14.7	5.5	4

Table : Influence of Degree of Yellowness on Barre Intensity
The influence of colour on the barre intensity is clearly seen from the last two columns of the table where the visual barre grade shows a direct relationship with the difference in +b values of the cottons used. An exclusive consideration of the +b value gave the following best-fit equation for the Visual Grade (VG).

VG = 5.101 - 0.078(+b) - ((4.393)/square(+b))

A good correlation of 0.90 was obtained between actual and predicted grades.

CONCLUSIONS

The influence of three important parameters - yarn count, fibre micronaire and fibre colour - on the intensity of the barre defect iin cotton knitted fabrics are discussed. Of the fibre parameters, the degree of yellowness of cotton seems to have a relatively more significant effect on the Barre intensity in fabrics than the micronaire. However even deviation of micronaire value to the extent of +0.15 results in a visible barre defect. Deviations in yarn count also shows up significantly as Barre defects. Avoidance of the Barre effect, therefore, requires proper control on all these parameters