

Various Wastage Areas of a Knitting Floor and Minimizing Procedure

By: Easmin Ara Tani

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Introduction

Knitting is a method which is prevalent from a very long time. It is a method by which a yarn or thread is converted into cloth or fabric or any other form. It can be machine made or hand made. There exist numerous styles and methods of hand knitting. During the process of making thread into fabric, any faults can result in wastage of yarn as well as efforts. Many other processes are also involved in the making of garment, apart from knitting. Wastage can occur in those places as well. All the wastages that occur on the knitting floor have been discussed in this paper. Wastage can occur due to many reasons. Certain steps can be taken to avoid wastage of yarn. Wastage may occur due to any reason like yarn, fabric faults, lack of machine maintenance, sample production, problem of management, etc.

Wastages occur due to yarn

Three main reasons of yarn wastage in knitting floor:

1. Faulty baby cone.
2. Fly generation.
3. Yarn fault.

Faulty baby cone: Due to faulty baby cone a major portion of yarn are wasted. Cone shape is very important. About 2-3% yarn are wasted due to faulty baby cone.

Minimization: To minimize the wastage percentage due to baby cone the cone shape & size should be checked very carefully during yarn production or yarn buy in cone form.

Fly generation: Fly generation occurs due to various thread guides & tensioner. About 1% of yarn is wasted due to fly generation.

Minimization: To minimize the wastage percentage due to fly the yarn must contain minimum amount of fly.

Yarn faults: Yarn faults are responsible for a maximum amount of wastages of yarn in knitting floor. Faulty yarns break so much & during knotting yarn are wasted. About 4-5% yarn are wasted due to yarn fault.

Minimization: To minimize the wastage due to yarn fault faults free yarn should be supplied. Combed yarn is more effective than carded yarn, because combed yarn contains less short fibers.

So in yarn stage about 8-9% wastage occur in knitting floor & it can be minimize by following the above steps.

Wastages occur due to fabric faults:

Faults occur due to yarn in knitting

In a knitted fabric, almost all the defects appearing in the horizontal direction are yarn related. They are mainly:-

i) Barriness:

The noun "BARRE** is defined by ASTM* as a repetitive visual pattern of continuous bars and stripes usually parallel to the filling of woven fabric or to the courses of circular knit fabric. It is unintentional. Barre normally runs in the length direction in a warp knit, following the direction of yarn flow. Barre can be caused by optical, physical or dye difference in the yarn, geometric difference in the fabric structure or by any combination of these differences. A barre streak can be several - a "shadow band" or it can be one course or end wide.

Barre should not be confused with "warp streaks", which in woven fabric are narrow band running lengthwise and are characterized by apparent differences in color from adjoining ends. Nor should it be confused with filling. A filling is a condition in which a filling yarn differing from the normal filling was accidentally inserted in the fabric.

Cause of Barre:

The varied and diverse causes of barre can generally be summed up in one word –INCONSISTENCY. Barre which is caused by an inconsistency can originate in one or

more of following categories -raw material (fiber), yarn formation/supply, and fabric formation. Within these three categories, factors which may cause or contribute to barre are listed as follows:

1. Raw material fiber
2. Yarn formation supply
3. Knitting machine

Prevention of Barre:

As outlined on the previous page, barre is caused by inconsistencies in materials, or processing. Consistency must be maintained through all phases of textile production to prevent barre from occurring. Stock yarns should be carefully and properly labeled to avoid mix-ups. Inventory should be controlled on a First In/first out basis; fugitive tints can be useful for accurate yarn segregation. All equipment should be maintained and periodically checked. Sample dyeing can be done to check for barre before beginning full scale production.

Through careful dye selection, salvaging a fabric lot with a barre problem may be possible. 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 should be able to offer assistance in this area. Also, if the cause of the barre is distribution of wax or oil, a more thorough preparation of the fabric prior to may result in more uniform dye coverage. With dose cooperation between pro-and quality control personnel, successful analysis and solution to barre problems can be brought.



ii) Spirality:

The ever increasing demand of knitted apparels has attracted attention in global niche market. Around 50% of the clothing needs are met by Knitted goods, in comparison to woven garment. It is well known that weft knitted fabrics tend to undergo certain dimensional change that causes distortion in which there is a tendency of the loops to bend over which causes the wales to be diagonal instead of perpendicular to the courses.

In other words, spirality occurs in knitted fabric because of asymmetric loops which turns the wales and course of a fabric into an angular relationship other than 90 degree, is a very common problem in single jersey knits and it may exist in grey, washed or state and has an obvious influence on both the aesthetic and functional performance of knitwear. The wale on the face is counter balanced by a wale on the back because of which it does not appear in interlock and rib knits.



Course spirality is a very common inherent problem in plain knitted fabrics. Displacement or shifting of seams, sewing difficulties and mismatched patterns are some of the practical problems arising out of the loop spirality in knitted garments. These problems are often corrected by finishing steps such as setting/ treatment with resins, steam and heat, so that wale lines are perpendicular to the course lines. Stability is often not established in such settings and skewing of the wales normally reoccurs after repeated washing cycles.

Causes of Generation:

The residual torque in the component yarn caused due to bending and twisting is the important phenomenon contributing to spirality. The residual torque is shown by its liveliness. Hence the greater the twist liveliness, the greater is the spirality. Twist factor or twist multiple affects the twists of yarn. Apart from torque, spirality is also governed by fibre parameters, cross-section yarn formation system, knit structure, yarn geometry and fabric finishing. Another factor that contributes to spirality is machine parameters. Example, course inclination will be more with multi-feeder circular knitting machines, thus exhibit spirality.

iii) Shrinkage:

A dimensional change resulting in a decrease in the length or width of a specimen subjected to specified conditions is known shrinkage. Shrinkage is mainly due to yarn swelling and the resulting crimp increase during washing in case of cotton fabrics. Yarn swelling percentage is more in polyester cotton blending yarn.

Reduction in length and width of fabric induced by conditioning, wetting, steaming, chemical treatment, wet processing as in laundering, in chemical practice and in literature the following terms have been used to describe the shrinkage which occurs in testing procedure:

a) Relaxation shrinkage:

During manufactures fabrics and their component yarns are subjected to tension under varying conditions of temperature and moisture content, after manufacturing when the fabric is taken

from the machine and keep on floor or store room, then the fabric tends to shrink, this type shrinkage is called relaxation shrinkage.

b) Felting shrinkage:

In case of wool fibers dimensional changes can be magnified by felting shrinkage .When untreated wool fibers are subjected to mechanical action in the presence of moisture.

c) Compressive shrinkage:

It is a process in which fabric is caused to shrink in length by compression. The process often referred to as controlled compressive shrinkage.

d) Residual Shrinkage:

After washing the fabric is shrunk. This type of shrinkage is called residual shrinkage. Residual shrinkage is the main factor of garments industry.

Causes:

- Twist factor; twist factor increases so that shrinkage will be increases,
- Stitch length; stitch length increases so that shrinkage will be increases,
- GSM; GSM increases so that shrinkage will be increases.

Remedies:

- In order to maintain the weight at a lower shrinkage, a finer yarn is used,
- In order to maintain the width, a larger Dia knitting machine or a longer stitch length is necessary.
- In order to maintain the same knitted tightness factor, or cover factor (square root of tex divided by stitch length) with a finer yarn, a shorter average stitch length must be knitted.

Changes in yarn count and stitch length also change the stitch density which again changes the weight and the width for a given level of shrinkage. Changes in the tightness factor will change the extensibility of the fabric and will also affect the amount of spirality

iv) Thick & Thin Places:

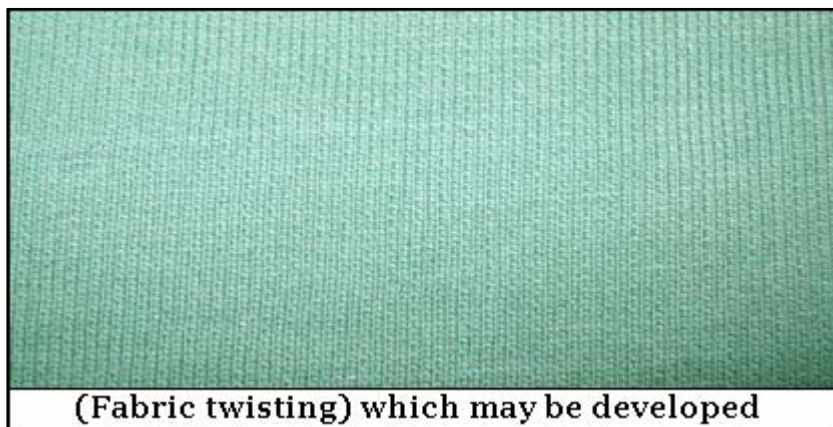
It causes due to yarn problem. If thick & thin places remain in yam & fabric is knitted with that yarn, then, this problem found in fabric.

Faults occur due to knitting

Almost all the defects appearing in the vertical direction, in the knitted fabrics, are as a cause of bad Knitting Elements. And some defects appear randomly in the knitted fabrics, due to the wrong knitting machine settings & that of the machine parts. The defects are mainly;

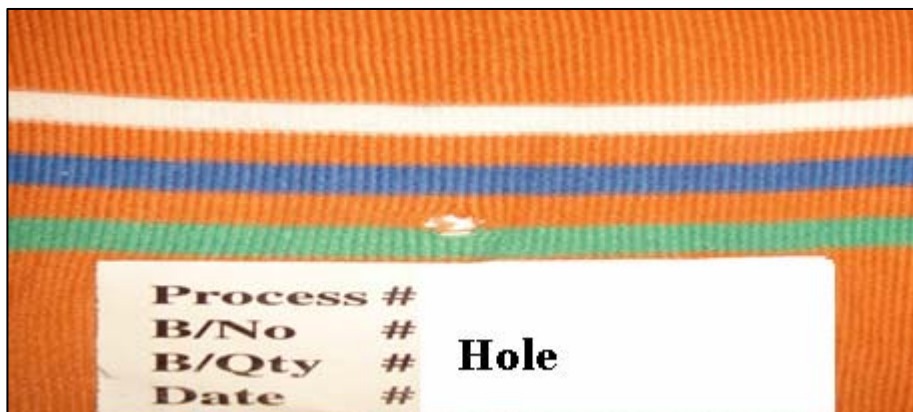
i) Cracks or holes

Local holes obtained when yam breaks during loop formation. Local holes obtained yam breaks during loop formation. Holes are the results of cracks or yam break-ices. During stitch formation the yarn had already broken at region of needle hook. Deciding on the knitted structure, yarn count, machine gauge and course density, the holes has different sizes. The size can therefore only be estimated if the comparable fabric is known.



Causes:

- Presence of knot in yarn.
- Weak places in yarn.
- Yarn tension too high.
- Yarn too dry.
- Yarn - guide not properly set,
- Yarn - guide block by yam hair accumulation.
- Poorly lubricated yarn.
- Loose yarn end can slide out of the loop.
- Yarn take- off uneven or dragging.
- Yam feeder not properly set.
- Relation between cylinder & dial loop not correct.



Remedies:

- Use of flat knots.
- Yarn regularity control.
- Yarn consumption & coulier re-adjustment.
- Precise yarn - guide resetting.
- Air humidification.
- Use of yam having lower hairiness, bobbins & yarn guide blowing.
- Use of protective filter creel.
- Use of fabric fault detector.

ii) Pin hole

Causes:

1. Improper tension.
1. Same drive for both knit & tucks stitch.
3. Curved needle latch.

Remedies:

1. Different drive has to be maintained.
2. Needle has no change.

iii) Fly Contaminations

Contaminations appear, in the form of foreign matter, such as; dyed fibers, husk, dead fibers etc., in the staple spun yarn or embedded in the knitted fabric structure.

Causes:

- Presence of dead fibers & other foreign materials, such as; dyed fibers, husk & synthetic fibers etc.
- Dead Fibers appear in the fabric, as a result of the, presence of excessive immature Cotton fibers, in the Cotton fiber crop.
- Dead fibers do not pick up color during Dyeing.



- Presence of the foreign materials, in the, staple fiber mixing
- (Kitty, Husk, Broken Seeds, dyed fibers & fibers like Poly Propylene, Polyester, Viscose etc)
- Dyed & other types of fibers flying from the adjacent Knitting machines cling, to the yarn being used for knitting & get, embedded in the Grey Fabric.

Remedies:

- Use rich fiber mixing for the yarns, to be used for Knitting, in order to have less dead fibers, appearing in the fabric.
- Rigid control measures in the Blow Room, to prevent the mixing of foreign matters in the Cotton mixing.
- Segregate the Spinning & Knitting Machines, with Plastic Curtains or Mosquito Nets, to prevent the fibers flying from the neighboring machines, from getting embedded in the yarn / fabric.

iv) Slub

It is usually caused by a thick or heavy place in yarn, or by ling getting onto yarn feeds.

Remedy: Good quality yarn should be used.

v) Needle broken

Causes:

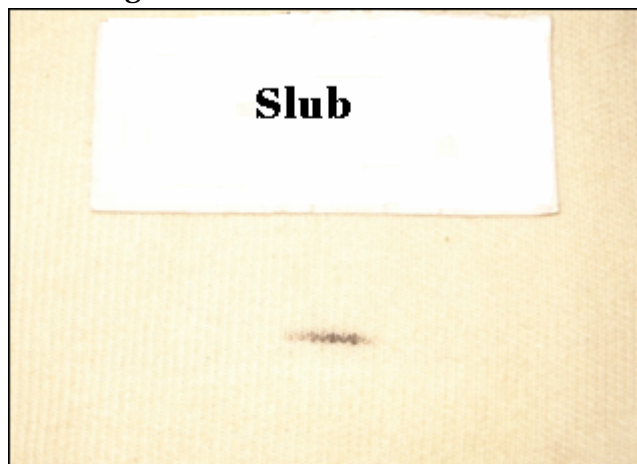
- Due to dirt deposition in needle this problem occurred.
- This problem also can occur due to yarn tension variation.

Remedies:

- Yarn tension has to minimize.
- Needle must be cleaned before production of any new fabric.

vi) Needle Lines

Needle lines are prominent, vertical lines, along the length of the fabric, which are easily visible in the grey as well as finished fabric.

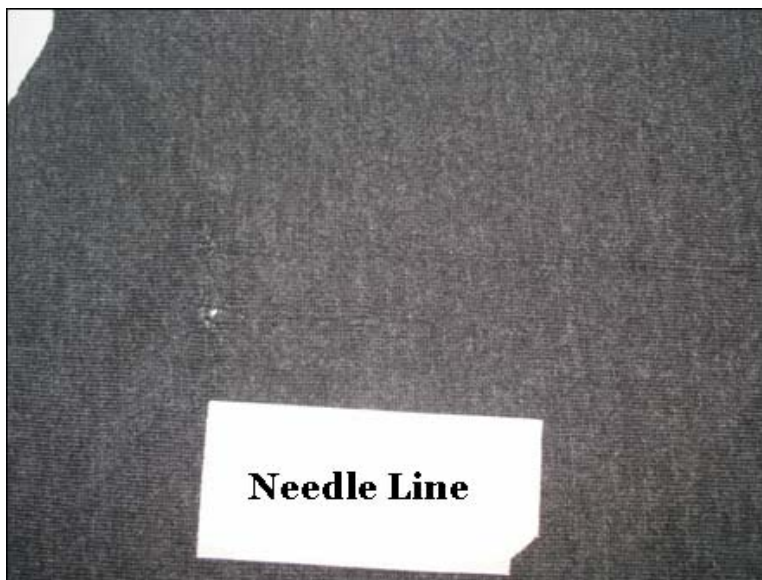


Causes:

1. Bent Latches, Needle Hooks & Needle stems
2. Tight Needles in the grooves
2. Wrong Needle selection (Wrong sequence of needles, put in the Cylinder or Dial)

Remedies:

1. Inspect the grey fabric on the knitting machine for any Needle lines.
2. Replace all the defective needles having, bent latches, hooks or stems.



1. Remove the fibers accumulated in, the Needle tricks (grooves).
2. Replace any bent Needles, running tight in the tricks.
3. Check the Needle filling sequence in the Cylinder / Dial grooves (tricks).

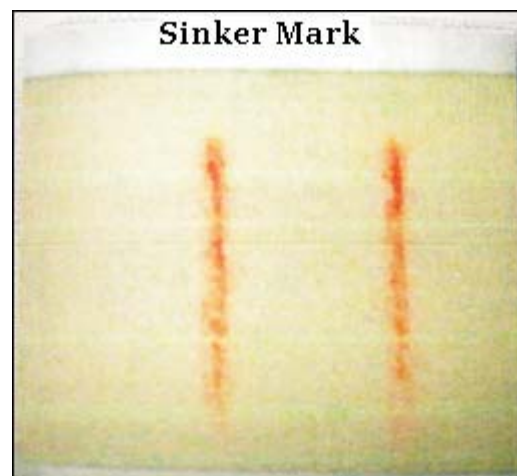
vii) Sinker mark

Causes:

- ☞ Sinker not cleans.
- ☞ Defected /broken sinker.
- ☞ Incorrect depth of sinker which causes the stitch length to change while the needle knocks over during its movement towards rest position.
- ☞ When darts deposited in sinker, it is raised & causes this fault.

Remedies:

- ☞ Sinker has to be clean.
- ☞ It should be checked that the sinker having correct thickness and depth.
- ☞ Replacement of defected sinkers.



viii) Line star

Cause: When needle latch is bent due to long time usage, then this problem occurred.

Remedies: Needle must be changed.

ix) Drop stitches

Causes:

- ☞ Yarn guide not properly set
- ☞ Defective needle latch.
- ☞ Yarn tension is not sufficient or too long stitches.
- ☞ Take- down too high.
- ☞ Cylinder - dial distance too high.
- ☞ Wrong yarn threading.

Remedies:

- ☞ Precise yarn - guide resetting.
- ☞ Needle change.
- ☞ Yarn consumption & coulier re-adjustment.
- ☞ Take-down re-adjustment.
- ☞ Dial position re-adjustment.
- ☞ Yarn threading through the right bore.
- ☞ This fault can be corrected by stitches reforming using a simple needle,
- ☞ Use of fabric fault detector.

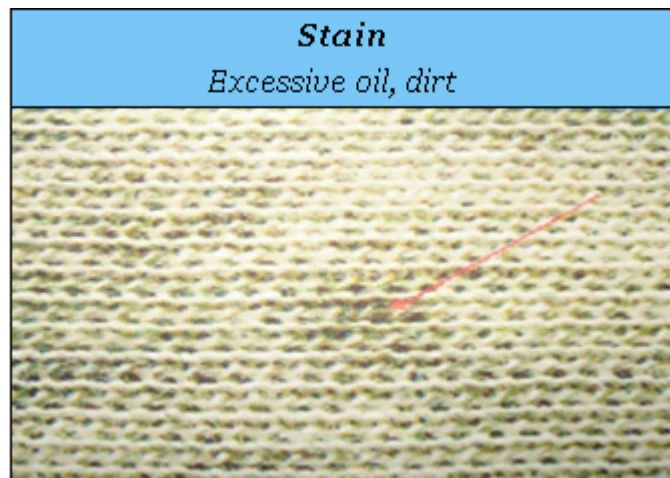


x) Stains

The knitting industry, unlike weaving, uses oil to lubricate machinery where the fabric is being produced, (i.e. on needles themselves). Such oil mixed with dust and metallic powder can, cause stain on the fabric being knitted.

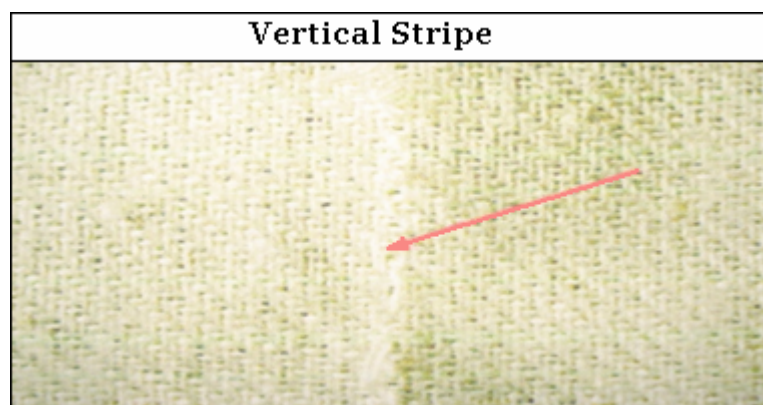
Way of minimizing the stains:

- i) Control of the oil itself, by applying it in minimum quantities and delivering it continuously, so that it present in the fabric but does not show up in any build up of soiled material.
- ii) Using oils that are readily mixed with water, so called scourable or clean oils.
 - ↳ The majority of knitted piece goods are wet finished before cutting and therefore, little oil staining will remain in finished fabric.
 - ↳ On stitch-shaped garment, tight control is needed as they are not wet finished, stains are dealt with during examination by solvent based spotting guns.
 - ↳ The problem is negligible in fully fashioned where oil is not used on the needles and where wet finishing is usual.



xi) Vertical Stripe

Vertical stripes can be observed as longitudinal gaps in the fabric, the space between adjacent Wales is irregular and the closed appearance in the fabric is broken up in an unsightly manner, vertical stripes and gaps in the fabric are the result of measurement setting i.e., the yarn count selected is too fine for the machine gauge or the stitch size (course density is not correct. Needles are bent, damaged, don't move uniformly smooth, come from different suppliers or are differently constructed.



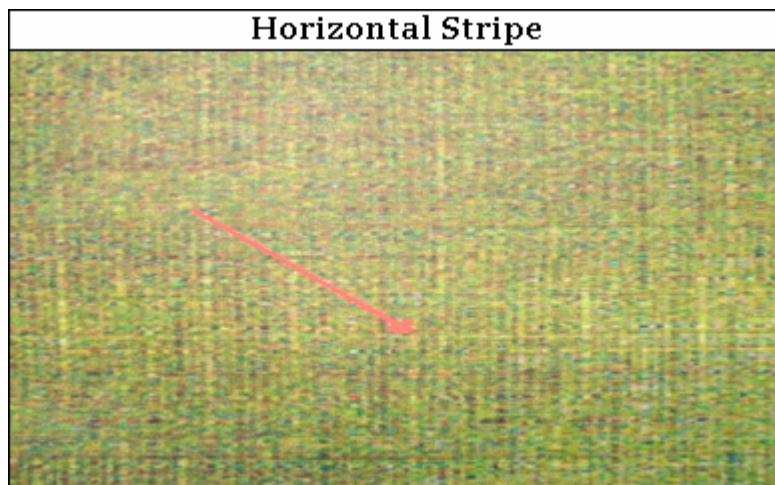
Causes:

- ♣ Defective needles and sinkers.
- ♣ Twisted or bent needle hooks.
- ♣ Stiff latches and needles.
- ♣ Incorrect closing of hook by the latch.
- ♣ Heavily running needles.
- ♣ Damaged dial and cylinder.
- ♣ Damaged needle latch and hooks.
- ♣ Damages on other knitting elements like cam, sinker etc.

Remedies:

- ♣ Using precise knitting elements.
- ♣ Correct lubrication of knitting elements.

- ♣ Ensuring perfect opening and closing of needle hook while it's movement through cam during raising and stitch formation.
- ♣ Before installing a needle it should be assured that the needle's hook is not broken.
- ♣ Ensuring the yarn count is perfect for the knitting machine gauge i.e., usually finer yarn should be used in m/c with higher gauge and vice versa. 6. Needles and sinkers changed after being used for a long time. Checking needle detector.
- ♣ Use of fabric fault detector.



xii) Horizontal stripe

Causes:

- Couliering & yarn consumption are not constant at all feeders,
- Deflector in dial cam brought into tucks position.
- Deflector not completely switched off. Needle can still grip the yarn & forms a tuck loop,
- Yarn feeder badly set.
- Differences in the yarn running - in tension.
- Jerky impulse from fabric take- up.

Solution:

- Yarn consumption & coulier re-adjustment.
- Take-down re-adjustment.
- Dial cam position re-adjustment.
- Use of fabric fault detector.

xiii) Tuck or Double stitches

Causes:

- i) Fabric take -up is insufficient.
- ii) The dial is set too high. The dial needles do not support the fabric, which is pulled up.
- iii) The course density or couliering is not set correctly.
- iv) The loops are too tight.

Solution:

- i) Take-down re-adjustment.
- ii) Dial position re-adjustment.
- iii) Yarn consumption & coulier re-adjustment.
- iv) Use of fabric fault detector.

So these are the main fabric faults found in knitting floor. Due to these faults about 2-3% wastages occur in knitting floor. Their minimization process also discussed in above.

Wastages occur due to sample production:

When a new order is taken from the merchandiser the knitting section first needed to produce some sample to examine. If sample is accepted then bulk production will be continued. Here some fabrics are wastages. The wastages amount of sample production is about 1-1.5%.

Minimization: Wastage percentage occurs due to sample production can be reduced by extra care of operator & programmer of the design of knitting.

Wastages occur due to machine maintenance: Before and after machine maintenance a small amount of fabric is wasted. About .5-1% fabric is wasted due to machine maintenance.

Wastages occur due to problem of management:

Manager will do the programme. If there is any faults occur in setting the programme then there will be a small or major amount of fabric will be wasted. It is all about the programmer's fault. About .5-1% of fabric may be wasted due to problem of management.

Minimization: This wastages minimization is possible to minimize by skilled manager or programmer. During programming the programmer should have extra care. Hence, mistake possibility will reduce & wastages due to management problem will be minimized.

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