SPINNING TECHNOLOGY & PRACTICES, MEETS INTERNATIONAL QUALITY REQUIREMENT OF YARN FOR TERRY TOWEL PRODUCTION.

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Abstract

As per as Indian textile industries are concerned the production of international quality of yarn considered to be big task, and only few mill can produce such type of yarn. This reflected on performance of industries and export side. In present investigation, Two methods described by the P Balsubramanian the first method followed by considering Uster standards while analyzing yarn qualities but this method required very quality of raw material which is very expensive to produce yarn quality which leads reduce performance of exports in international market. While in Second methodology P Subramanian suggested to consider buyer specification ,Precautionary handling of material in post spinning process and systems to be followed while producing export yarn ,Work practices to be avoided during preparation of the export quality yarn, by using online quality systems like sliver data, Ring data ,Cone data systems equipped on machine which leads improve spinner judgment and easy to check material 100% and finally meet export or international quality requirement.

Keywords: *International yarn quality, RKm, Thick and thin imperfection, yarn coefficient of variation, Buyers specification, Work practices, systems.*

Introduction

Yarn quality requirement is changing every day. Quality requirement is different for different end uses and it is different for different customers. But it is difficult to produce a good quality yarn with a minimum deviation. Amongst the other factors machine and process parameter plays major role in deciding upon product quality and productivity. It was felt that standardization of machine and process parameters along with correct work practices would help to improve upon quality and productivity.

Quality of yarn should be at least within 25% Uster which means the quality is among the best 25% of the mills in the world. Normally shuttles weaving machine works three to four times faster and if the quality of warp remain same ,warp break will increase three to four times resulting in low production. Yarn should be more even and following parameter of the yarn are critically reviewed i.e. C.V. of Count, Single yarn strength, C.V. of Single yarn strength, Imperfection per 1000 meters such as thick place, thin place, and neps. Yarn requirements in terms of strength, uniformity and freedom from imperfections are dependent on two considerations: the performance & appearance requirements of the cloth, and the level of productivity which is expected of the operatives. As the first consideration does not constitute a severe constraint, it is only necessary to take

account of the second one. This essentially involves achievement of the most economic balance between labour costs and machine utilization factor. No problems arise in the case of auto looms /Unconventional: the weaver continues to tend only one loom whatever quality of yarn is provided as his productivity should not fall substantially if yarn quality is lowered. Fall in productivity - in comparison with productivity achieved with perfect yarn - should not exceed 20% if the lowest quality yarn were used.

The use of low quality yarns inevitably leads to higher breakage rates and consequently, to an increase in the number of operative hours needed to produce a given quantity of cloth. However, the type of loom used does not have a first order effect on the amount of time spent in the repair of a weaving break, either of warp or weft. At the lowest level of yarn quality - consistent with fabrics covered by this memorandum - one weaver might reasonably be expected to tend two non-automatic power looms or four automatic looms. With very well prepared yarn of the highest quality, one weaver could tend six non-automatics or up to sixty automatic looms. Thus, the labour-saving potential of the automatic looms is much more severely curtailed by the use of low quality yarn than is the case with non-automatic looms. This does not necessarily mean that automatic looms require better yarns, or that it is less economic to use automatic looms in conjunction with low quality yarns. The basic consideration is that the amount of labour needed is reduced when the quality of yarn is raised regardless of the type of loom. Thus, in high wage cost countries, weaving becomes profitable only if yarn quality is high. Furthermore, as the higher capital cost of automatic looms is justified by the high wages, it is usual for high quality yarns to be used in conjunction with automatic weft replenishment.

Yarns which are used in Towels:

In a terry towel there are four groups of yarn. These four groups are the pile warp, ground warp, weft (filling), and border weft.

Pile Warp:

One hundred percent cotton yarns, carded or combed, in sizes of 16/1, 20/1 Ne counts, 240-255 turns/meter twist, are most commonly used. While towels of the fashion type are mainly piece dyed or printed. In general bulkier and absorbent yarns are used for both types of towels. Rotor spun yarns are also used in pile warps low twist cotton.

Ground Warp:

Carded yarns of 20/2, or 24/2 Ne count with 550 turns/meter twist, and of 100% cotton are commonly used for ground warp ends. Two ply yarns are preferred because the ground warps ends have the highest tension during weaving. It is common to use a yarn of cotton/polyester blend for greater strength. Rotor spun yarns are also used in ground warps.

Weft: Carded yarns of 16/1, or 20/1 Ne counts with 240 – 255 turns/meter twist, 100% cotton are used usually for weft or filling picks. Rotor spun yarns are also used in wefts.

Border Weft:

Premium or high end hand towels have complex borders with fancy weaves and use a very wide range of filling yarns. Decorative, shiny and bulky yarns of rayon, viscose, polyester, chenille, or mercerized cotton are used at different yarn sizes. Novelty types of yarns may be used as a feature of design

Spinning Technology required for terry towel product:

The cotton yarn used in terry towel are produced by ring spinning technology or open end spinning technology which are specially developed for producing warp pile yarn for terry towel.

Ring Spinning:

The principle of ring spinning is first mixing or blending the fibers, opening them and arranging as much as possible parallel to each other .Second is to give the fibers a twist in order to increase the friction forces between fiber and assure they stay as yarn and draw them to the desire size. These are achieved in several steps as follows.

Blow room and Carding OR Prior process:

All staple fibers are processed through blow room and carding ,After opening of the cotton loose fiber goes in to the carding machine ,Here Fine flats wires on revolving cylinders pull the fibers apart, remove adherence of waste which is associated with cotton fibers and begin to arrange the fiber enough that they can be spun in to yarn. Fiber emerges from carding in the fine web, which is gathered together in to loose, fine web called as sliver. After carding, fiber is taken through a number of stages to become yarn.

Combing:

An extra process is introduced called combing for high quality yarns. The purposes of combing are to 1) Remove Hooks 2) Remove short fiber 3) Improve fiber orientation.

Drawing (Drafting) and doubling:

This is process of running slivers between set of rollers, each moving faster than ones before, which draw out or draft a number of slivers to the thickness of one: this process is repeated until the fibers are well mixed.

Speed frame:

Speed frame draws the sliver out to a strand about the size of pencil, called roving are carried by the traveler around the edge of the ring, inside which is faster rotating spindle.

Spinning:

During spinning the roving is drawn out to yarn size and given considerable high twist to become yarn. In ring spinning, twist is inserted as fibers from roving are carried by the traveler around the edge of the ring, inside which is faster rotating spindle.

Carded, combed, open end, low twist yarn for terry towel:

Carded yarn has fuzzy appearance and loftier than combed yarn. Fabrics made from carded yarn have more hairy surface and will neps more than fabrics of combed yarn.

Combing removes any shorter fiber and arranges the remaining lowest fibers more or less a parallel to each other. During combing about 15% further weight is lost combed sliver has silkier appearance.

Open end yarn : The basic principle of open-end spinning is sliver are feeding through feed roller ,opening by high speed revolving opening roller and fibers feed through transport tube and deposited on surface of rotor and high speed rotor inserted twist to fiber strand yarn withdraw through tube and wound on winding roller. The open end yarn has following properties bulkier, less strength compare to Ring yarn ,less U %, due to these properties it can be used for pile yarn in terry products.

Low twist yarn:

The basic difference between low twist and the other cotton yarn is fiber. While ring spun towel use a combination of long and short staple cotton fiber, low twist must be constructed only from loner staple cotton yarn. After the fiber is made in to low twist yarn, it must be wound with polyvinyl alcohol(PVA) yarn to keep the cotton intact without the need for twisting . PVA dissolved during dyeing and yarn obtained with extremely low twist yarn. This type of yarn is called as low twist, zero twist, no twist yarn which can used for terry products.

Quality evaluation methods:

P Balsubramanian suggested two methods method, first method followed by considering Uster standards while analyzing yarn qualities, and meet international standards.

Second methodology P Subramanian suggested to consider buyer specification ,Precautionary handling of material in post spinning process and systems to be followed while producing export yarn ,Work practices to be avoided during preparation of the export quality yarn, by using online quality systems like sliver data, Ring data ,Cone data systems equipped on machine which leads improve spinner judgment and easy to check material 100% and finally meet export or international quality requirement.

International quality:

Most of the spinners under impression that, international quality means that all yarn quality specification should be either equal to or better than uster 25% value most of manufacturer try hard to attain international quality level by going for good quality of raw material at higher cost or sacrificing productivity at critical stages in production line. But as mentioned in uster statistics, A yarn whose mean value for all yarn characteristic lie below uster 25% line value of uster statistics is seldom encountered and if so, it must refer to yarn from expensive and special raw material. Practical experience has shown that yarn need not necessarily be

perfect in terms of all characteristics, it must not advisable meet statistics for all quality parameter but it is more important to meet buyer specifications.

Specification of buyer:

In export market buyer specify the quality requirement level, generally following parameters are specified.

- Lea count and its Coefficient of variation
- Rkm and its Coefficient of variation.
- U% with imperfections
- ASTM appearance grade
- TPI variation.

Beside the above the buyer specify whether yarn should necessarily be electronically cleared and spliced and I case of double yarn weather it should be twisted on two for one twister. Occasionally some buyer specifies total number of objectionable fault as measured by classimat.

Intrinsic quality requirements:

Meeting the specification is one part of yarn quality and the other part which is more important is the performance of the yarn on the buyers machinery and ultimate quality of his end product is the yarn should withstand various parameter, processing condition and produce defect free product/yarn. Therefore spinner should aware of the end use product which is supplying to his customer and Ultimate quality index is customer satisfaction rather than yarn specification.

Yarn quality evaluation:

Many mills yarn evaluated for various quality characteristic like count strength and their variability's, U% and imperfection, yarn appearances etc at ring frame stages. Only few mills evaluate yarn at cone stage , In the most of the mills post spinning operation were neglected both in terms of housekeeping renovation, modernization which leads to deteriorate the yarn qualities. In order to improve the quality of the yarn following quality evaluations in post spinning process were suggested.

- Each cone should be checked physically, proper package density, and contaminations free.
- Rewinding test should be conducted at higher speed particularly for export yarn i.e. 1000 mtr/min. Record breaks should be at the most one per lakh meter. At least 10 lakh meters should be evaluated at classimat.
- Objectionable fault should be less than 2 per lakh meter.
- Quality of splicer and knotter should be checked al least once in week.
- Cone weight variation should be minimized (+-50gms)
- Yarn test, should be evaluated on high volume testing

System and practices followed in export unit

ForMaterial identification:

In order to avoid mixing of two different counts, following system suggested for material identification.

- Tinting should not used to identify the material.
- Different colored card and draw frame cans used to identify the mixing
- Different colored ring and roving bobbins were use to identify the material.
- Cone with different colored sticker were use to identify the material.

Cotton processing practices:

The effort are made to make material more uniform

- Arrange the card at draw frame creel in such manner that all card equally represented.
- Arrange breaker cans in row form and feed finisher cans in column form.
- Use block creeling system for speed frame and ring frame.

Work Practices

Most of the yarn faults in final yarn observed due poor work practices which leads to deteriorate yarn qualities .In order to avoid bad practices and ensure the good qualities following work practices followed by worker strictly avoided.

- Over end piecing at ring frame never allowed.
- The ring frame as well as roving creel piecing should be totally discouraged.
- In draw frame creel piecing should be done carefully, ensure it does not result in long thick place.
- Worker should be aware of poor qualities.
- A continuous training scheme should be provided for worker.

Quality Assurances:

In order to obtain good quality of yarn, spinners should implement online system on machine such as ring data, sliver data, cone data with these systems spinners in position to check 100% of material produced.

Conclusions

Present investigation reveals that, two methodology were given to obtain quality First method required rich cotton quality parameter and even sacrificing production ,quality increase stoppages one can difficult to meet international quality standards which was deterioration performances of exports.

In Second methods, in order to obtained international qualities in terry yarn following area is to be concentrated.

- Concentrate on specification of buyers
- Take necessary precautions while producing yarn
- Yarn qualities & its evaluation
- Avoid bad working practices
- Select the online technologies, which have online monitoring systems in order check the material 100%.

By taking simple precautions during spinning, gives improvements in the performance export and Second method is quite easy to understandable and installable in Textile industries.

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A ready reference copy of USTER STATISTICS enclosed with this study, it contents, yarn properties evaluated for different count used in Weaving.

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