A Study of Stretchable AIRJET Textured Yarn – A Technical Review

Manish Bhatia¹ Haresh Ladumor² Vaishali D. Shah³

¹,²Department of Textile Engineering
³L. D. College of Engineering

Abstract—Airjet Texturing process is mechanical method to produce bulkiness in the yarn. Also the feed yarns need not to be restricted to synthetic yarns. The air textured yarns resemble spun yarns in their appearance and physical characteristics. The air-jet Texturising process is the most versatile process of all the yarn texturizing methods in that it can blend filament together during process.

Key words: Airjet Textured Yarn, Lycra Blend Airjet Textured Yarn, Stretchable Textured Yarn

I. INTRODUCTION

Most Natural fibres have a certain amount of crimp and waviness that helps to impart some degree of bulkiness, a property considered very desirable in textile fabrics. The texturing of thermoplastic yarns has been one of the most exciting developments in the field of textile processing. This process has completely revolutionized the use of nylon and polyester yarns in the men’s and women’s apparel, rug and carpet, and hosiery and knitting industries. Texturising helps improve the pill and crease resistance and confers better dimensional stability, fuller and better appearance, great durability, flexibility, better covering power, easy to wash, dry readily, high abrasion resistance, strength and bulkiness.

A. Market Demand of Airjet Textured yarn

As in a survey it is seen that about 20% to 25% of total cloth production contributed only by Air Textured yarn/fabrics and now days it is widely used in technical textile field such as in tyre, belt, golf bags, filter etc.

II. LITERATURE SURVEY

A. V. K. Kothari & N B Timble

This paper presents distinguishing features of different air texturing jets have been described and the test methods used to assess some important properties of air textured yarns. The properties of air textured yarns produced using various currently used commercial jets have been compared. The results show that the performance of cylindrical jets and Taslan type XX jet for parallel end texturing of 76den/36 fil polyester yarns is superior. The effects of some important process parameters such as overfeed percentage, air pressure and heater temperature on various properties of airjet textured yarns have been reported. The relationships between air jet textured yarn properties and processing parameters have been assessed in terms of regression equations and it has been shown that with a few exceptions, most of the properties of air jet textured yarns are linearly related to the process parameters.

The results show for texturing the two ends of a 76den/34fil yarn together, HemaJet T100, HemaJet T310 and Taslan XX shows relatively better performance as compared to the other jets. Air Jet textured yarn properties like instability, physical bulk, hot water shrinkage, core diameter, loop size, loop frequency, tenacity, breaking extension and initial modulus are affected by process parameters such as overfeed, air pressure and heater temperature. However, a log-log relationship between instability and overfeed is observed. The effect of various processing parameters on the properties of air jet textured yarns indicates that overfeed has much greater effect than the other two process parameters, viz. air pressure and heater temperature.

B. V. K. Kothari & V K Yadav

This paper presents parallel end airjet texturing of filament yarns with different shrinkage potential results in decrease of bulk with the increase in shrinkage difference level initially, but then increases with further increase in shrinkage difference. The study suggests that shrinkage difference in the feeder yarn is not an effective way to increase the bulk of air jet textured yarns.

The shrinkage potential is drawn yarns decrease as the drawing temperature increases. Bulk and instability first decrease and then increase with the increase in shrinkage difference between the two ends of feed yarns to air jet texturing machine.

C. V. K. Kothari, A. Mukhopadhyay & R C D Kaushik

This paper presents the crease recovery of fabrics in relation to the nature of weft threads (air jet textured yarn or flat yarn), pressure level during thickness measurement, pick density and heat set have been analyzed. On heat setting, the fabric thickness and specific volume increase appreciably for the textured yarn fabrics. The difference in fabric thickness with the increase in pick density of textured and flat yarn fabric are dependent on the pressure level applied during thickness measurement. Increase in pick density, in general, leads to decrease in fabric specific volume. Fabric specific volume derived from the thickness measured at 5gf/cm² pressure should be used for assessing air jet textured yarn bulk.

The nature of change in thickness and specific volume of air jet textured and parent yarn fabrics with the change in pick density is dependent on the pressure level. At higher pressure, the thickness and specific volume of grey and heat set fabrics decrease marginally with the increase in pick density whereas at low pressure, the above fabrics parameters are influenced by the fabric constructional parameters and surface irregularity. On heat setting, the textured yarn fabric thickness and specific volume increase. For the evaluation air jet textured yarn bulk, the physical bulk derived through woven fabric method is not very useful. However, fabric specific volume at 5gf/cm² can be used for assessing the air jet textured yarn bulk.

D. V. K. Kothari & A Mukhopadhyay

This paper presents the crease recovery of fabrics in relation to the direction of creasing, pick spacing, heat setting and number of filaments in air jet textured weft yarn has been
investigated. With the increase in pick density, the warp-wise crease recovery of air jet textured yarn fabrics decreases and a reverse trend is observed in weft direction. The textured yarn fabrics exhibit much lower crease recovery than the corresponding parent yarn fabrics. The finer filament textured yarn fabrics possess higher crease recovery than the coarser filament textured yarn fabrics. Heat setting improves the overall crease recovery of fabrics. Improvement in crease recovery is higher for textured yarn fabrics, particularly in weft direction, after heat setting the peak value of crease recovery occurs at different biased direction.

With the increase in pick density, the warp-wise crease recovery of air jet textured yarn fabrics decreases, but the trend is reversed in weft direction, the crease recovery of textured yarn fabrics is much lower than that of the corresponding parent yarn fabrics. With the higher number of filaments in the textured yarn, the crease recovery is higher for all types of fabric.

Heat setting improves the overall crease recovery of fabrics. However, the improvement is higher for textured yarn fabrics, particularly in weft direction. After heat setting, the peak value of crease recovery occurs at different biased direction.

E. R S Rengasamy, V K Kothari & Asis Patnaik
This paper represents Stress-Strain Characteristics of air jet textured yarn are affected by many factors, including overfeed and constituent feeder yarn properties. After texturing, there is a considerable reduction in tenacity and modulus of yarns. Yarn extension at peak load mostly decreases moderately after texturing. Majority of the textured yarns exhibit catastrophic tensile failure...Core-wetted textured yarns textured with less number of coarse effect filaments exhibit non-catastrophic tensile failure. Normal (parallel-feed) textured yarns are more extensible and have less initial modulus.

Most of the textured yarns undergo catastrophic failure under tensile load. Tenacity and modulus of yarns after texturing deteriorate considerably. Usually, in the majority of the cases, yarn extension at peak load decreases moderately after texturing. Yarn extension at peak load improves after texturing when the filaments have high variability in their breaking extensions. Tensile failure of core-wetted textured yarns is non-catastrophic when less number of coarse filaments is used in the effect component. Effect-wetted and normal textured yarns predominantly break catastrophically. Normal feed textured yarns have more tenacity and strain at maximum load and low modulus compared to core and effect yarns textured with high differential overfeeds, higher the difference between the overfeed values of core and the effect components, the lower are the tenacity and strain at maximum load.

F. Wickramasinghe G.L.D, & Foster P.W
This paper presents dimensionally stable textured filament yarns are recognized as having important attributes, which are suitable for fabric production and sewing threads. The most successful method of texturing to achieve the above yarn qualities is spun like textured yarn produced from air jet texturing with post textured heat setting. Even though high pressure air has been used and established for manufacturing spun like textured yarns, there is no evidence on research work to investigations the suitability of other high pressure fluids such as steam and water. The objective of this research work was to use high pressure steam in order to replace air in air jets in the production of spun like textured yarns and investigate the effect of post textured heat setting on textured yarn properties. An existing air jet texturing machine was modified to supply and control both compressed air and high pressure steam to the texturing nozzle. Effect of post textured heat setting on loop instability, shrinkage, strength, tenacity, elongation and linear density of the steam – jet textured yarn was studied and compared with air jet textured yarns. Results show that instability, loop density and shrinkage of both air jet and steam jet textured yarns decrease when the temperature is increased. Further, it was observed that the instability, loop density and the boiling water shrinkage of steam-jet textured yarns are lower than that of comparable air jet textured yarns before the textured yarn is heat set.

G. Serpill koral koc, Sebnem Duzyer, Asli Hockneberger
This paper presents determination of the instability of air jet textured yarns is very important aspect of their quality characterization. To overcome this problem many researchers have suggested different techniques, however none has been accepted as a standard method. Among all the methods, that suggested by Demir takes attention, since it was improved after investigating the advantages and disadvantages of most of the techniques in use. Recovery from strain measurements are commonly used to get information about fiber molecular structure. In this study, instability of air jet textured yarns was investigated by using both demir’s instability test method and recovery from strain measurements. It was observed that Demir’s method is a practical and reliable way to compare the instability of air jet textured yarns produced from the same raw material. For comparing different materials it was more beneficial to use recovery from strain measurements.

Demir’s instability test method is practical, fast and gives satisfactory results in comparing air jet textured yarns produced from the same type of polymer. On the other hand, recovery from strain measurements consider the behavior of the polymer itself. Therefore in comparing yarns produced from different polymers it is more beneficial to use recovery from strain measurements.

In this study, it is clearly seen that the loop type plays an important role on the stability. Areas and open type loops, as seen in Vectran (Figure E,F) gives lower stability, on the other hand closed loops, as seen in PET ad PBT ( Figure A, B, C, D) introduced more stable yarn structures. The recovery from strain measurements reflect this fact clearer compared to Demir’s method.
Airjet Textured stretchable yarn is having good recovery and stability and can be used in bottom wear fabrics for stretch to fit items.

REFERENCE


III. CONCLUSION

In Today’s world air jet textured yarn is widely used in various industries such as dress material, home textile, furnishing and technical textile field due to its natural fiber like appearance. Also it having better strength, crease resistance and stability.