AN INVESTIGATION ON THE INCONSISTENCIES IN THE WIDTH OF SINGLE JERSEY FABRIC PRODUCED AT ABC KNITTING MILL

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MSc in Textile & Clothing Management

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Declaration

I declare that this is my own work and this thesis does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any other University or Institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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Signature: Date: 30 August 2024

The above candidate has carried out research for the Masters thesis under my supervision.

Name of Supervisor: Dr. Gayani K.Nandasiri

Signature of the Supervisor: Date: 30th August 2024

ABSTRACT

ABC Knitters (Pvt) Ltd; a leading weft knitted textile manufacturer in Sri Lanka, has been encountering a problem regarding the width of their finished single jersey fabric. They claim that certain fabric batches are found to be inconsistent in roll width after dyeing. Such fabric rolls indicate a tendency to narrow side in width. There is no reliable method in place at the knitting mill for predicting the fabric width in grey state or dyed state. It was further noted that different industrial knitters use their own methods to predict the fabric width merely based on their own experience. Thus, at the finishing stage main focus is to meet the specified width in finished fabric by using various finishing techniques such as Stenter process or a heat setting.

This research has focused on many experiments to study the factors which affect the width of knitted fabric. The effect of yarn count, machine gauge and the shrinkage of yarns during coloration process have been studied in this work. The impact of heat setting and its limitations have also been studied. The in-depth experimental analysis carried out to study the effects of knitting variables on grey fabric width and the dyed fabric width is one of the most important parts of this research.

Eventually this research has introduced two special phenomena occurring during the knitting process and dyeing process. First one is the increasing grey fabric width over minimum range of loop length. According to the existing knowledge, the smaller the loop length lesser the fabric width. It has been revealed by this research that the grey fabric reverses this known behavior at a certain value of loop length and begins to increase the width when the loop length is further reduced. Second one is the relatively high widthwise shrinkage occurring during wet process of the fabric knitted in minimum loop length range. This research has revealed the dependency of dyeing shrinkage upon the loop length. For any given weft knitting machine and a given yarn, the highest widthwise dyeing shrinkage is exhibited by the fabric sample knitted at the minimum loop length. In certain cases, at smaller loop length ranges such as 2.4mm to 2.5mm, the widthwise shrinkage may be as higher as 38% while the shrinkage at larger loop length ranges such as 2.8mm to 3.0mm may be around 30%. This unexpected higher shrinkage could be identified as the root cause of the problem encountered by the textile mill.

In addition to the fabric width, area density has also been included into the study as they are interrelated parameters from the manufacturer's perspective. The outcome of this project suggests a graphical method and a set of basic rules to be followed by the knitter while adjusting the knitting machines to produce fabrics with different area densities.

"Future works" provide suggestions on how to expand this study following same methodology. An expanded future research can involve the rest of knitting machines, yarn counts and yarn types that could not be studied during this research due to the lack of time.

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