

# **The Effect of Different Structural Factors on the Functional Properties of Warp Knitting Fabrics**

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## **Abstract**

Warp knitting is considered - so far - the most versatile, widely used and productive structure in the field of textiles in general, because warp knitted fabrics can be produced using flexible or fixed structures by an open or closed structural composition, and can also be produced as either flat, i.e. open in width, tubular or three-dimensional. The width of the weaving reaches 6 meters or more, even twice that width, without stitching the edges of the weaving to each other, even if the installation used is a net.

This great development helped in changing and developing the engineering of knitting fabrics production by introducing many methods to produce modern warp knitting fabrics with different methods. While maintaining the cost of economical production, they were helped by the flexible property of controlling the installation of warp knitwear, which attracts both the designer and the producer.

(7 samples) of warp knitting fabrics were designed and produced by using more than one feeding rod which was implemented on a raschel knitting machine using a 44/12 polyester thread, with determining the best implementation specification she was able to get. Laboratory tests were conducted to evaluate the functional properties of the produced fabrics under study, which showed after they were conducted that the difference in the number of feeding rods in warp knitted fabrics clearly affects the functional properties of the produced fabrics and gives strength to the different stresses on the fabrics during use.

## **Introduction**

For nearly fifty years, the areas of use of warp knitting products were limited to women's underwear (lingerie), sports shirts made of rayon, glove fabrics, high-end fabrics for women's dresses and shawls, and to a very limited extent cotton fabrics, and now, warp knitting products have become suitable for almost every area of use of textile fabrics, such as: outerwear, work clothes, sportswear, evening wear and in the field of home textiles - especially for curtains, upholstery fabrics, general are being used for interior design fabrics (decoration), bed covers and terry towels, as well as a broad perspective on technical (industrial) fabrics and it is used at Industrial, agricultural, marine, packaging products, and products for medical purposes and in

most of the different applications of protective and security fabrics, and thus we can consider that warp knitting fabrics play a prominent role, and warp knitting machines have developed, where it was possible to produce a machine with 12 rods for feeding, then progress increased in this type of machine until it was possible to reach the use of 42 feed rods by inserting a column of different pressure on land weights, which made it possible to produce new designs.

(1)

As for the structural composition of knitted fabrics, it helps the presence of voids that facilitate the passage of air and help to ventilate the body and reduce perspiration and affect the temperature. It also makes it more resistant to wrinkling than woven fabrics and more flexible, which makes it easy to store so that wrinkles disappear quickly after the clothes are unloaded and suspended, and it is convenient to use and allows movement to become free without permanent folds in clothes, and it is also soft and often light in weight, and some of them do not need any means of ironing, but can be laid flat for drying to restore their shape and appearance with its high absorbency. ..(2)

Warp knitting is by far the most versatile, widely used and productive structure in the field of textiles in general because warp knitted fabrics can be produced using flexible or fixed structures by means of an open or closed structural composition.

### **Research problem**

Despite the technological progress in the production of warp knitted fabrics, most of the methods used are still done using traditional methods. Therefore, it was necessary to study the possibility of producing warp knitted fabrics with different designs and structural compositions to improve the functional properties of the produced fabrics and increase the durability of the fabrics towards the various stresses on them during use. .

### **The research importance**

The importance of the research lies in the use of warp knitting machines to produce warp knitting fabrics with different materials and structural compositions to improve the functional properties of the produced fabrics and increase the fabrics' endurance to the various stresses on them during use with determining the best operational specification for them.

### **The research aims**

- 1- Improving the production and design of warp knitting fabrics with different structures by controlling the machine settings to increase the strength of the fabrics to bear the different stresses on them during use.
- 2- Reaching for the best executive specification to verify the functional properties of the produced fabrics.

### **Research hypotheses**

1. The use of different structural structures to produce samples of warp knitting affects the functional properties of this type of fabric.
2. The use of different settings has a great effect on the functional properties of the produced fabrics.

## Research Methodology

This research follows the experimental and analytical methods.

## 4- Conclusions: -

1. The greater the number of feeding rods, the greater the weight, thickness and explosion resistance of the sample produced, and the greater the strength of the fabrics bearing the different stresses on them during use.
2. Each feeding rod moves differently, a structural component that interlocks with the structural structures of the other rods, increasing or decreasing the fabrics' tolerance of the different stresses on them depending on the number of feed rods for the fabric produced.
3. The fifth sample achieved the highest weight, the highest thickness and the highest explosion resistance because it contains 6 feeding rods, while the fourth, sixth and seventh sample achieved the lowest explosion resistance because they consisted of 2 feeding rods.

## 5- Recommendations

1. Interest in expanding the scope of scientific research in the field of warp knitting due to its functional properties.
2. Further study of the factors affecting the production of warp knitted fabrics and their relationship to the functional and aesthetic properties of the produced fabrics.
3. Using different materials and compositions in the production of warp knitting samples.

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