# Improving the Production Variables and Designing Innovative Complete Garment Pieces on Seamless Weft Knitting Machine

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## Abstract

Knitted fabric industry has developed greatly in the world, especially in recent years, to the extent that it has become competitive with woven fabrics; In the modern era, this type of construction has spread rapidly in various industrial fields due to the development of the properties of the used yarns with the consumer acceptance of knitting products of all kinds on the basis that they are in line with fashion and give comfort in terms of flexibility and good suitability for the final use, in addition to the cheapness of their price due to the low costs of their production. The progress and development of the production of knitting machines to the expansion of the use of knitted products, not only in the field of traditional clothing, but also entered these fabrics in industrial uses, home furnishings, sports clothing and others.

The aim of this research is to design and produce complete innovative knitted pieces with functional and aesthetic properties using new techniques by adapting the capabilities of the circular seamless weft knitting machine.

Six pieces of women's home clothes of different designs were produced using different materials and yarns. Nylon was selected with Lycra material to produce all research samples, with the difference in yarn count, Nylon count 20 (1/20/20) ,40 (1/34) and 70 (1/78/68) denier with Lycra count 20 denier All samples and dressed pieces are designed and produced on Seamless Weft Circular machine with Gouge 28 using different designs of executed pieces. Laboratory tests were conducted to evaluate the functional properties of the vector wear pieces, taking advantage of the capabilities of the used machine and specialized design programs to reach the best production specification.

By conducting a statistical analysis of the results, it was found that there is an effect of the difference in yarn count and the executed design on the functional properties of all produced pieces of clothing (cloth thickness (mm) - weight per square meter ($g/m^2$) - air permeability cm / $cm^2$. Bursting strength (Pa)) to reach the best standard specification for production.

## Keywords:

Weft knitting ،Structure ،Seamless machines

## 1- Introduction

The progress and development of the production of knitting machines led to the expansion of the use of knitted products, not only in the field of traditional clothing, but also entered these fabrics in industrial and technical uses, home furnishings, sports and indoor clothing, and others (1). The unique feature of the knitting industry over other textile industries is that only knitting machines can produce or complete a (almost complete) manufacture of clothing directly, either by adding or decreasing buttonholes during operation on the well-known Seamless Knitting Machines. There are several types of these machines, including rectangular and circular weft knitting machines (such as hosiery and foliage fashion machines), and there are also black knitting machines, all of which are characterized by the production of complete clothing on the machine. Thus, the Seamless Knitting Machine is characterized by reducing some production processes such as the stages of cutting or knitting, while reducing the incidence of defects, and reducing the waste of threads and fabrics, which preserves the environment in addition to reducing the need for labor and saving production time and thus reducing costs, which achieves higher quality and functional and aesthetic properties Better than traditional knitwear. This method also allows designers to produce different designs of decorations and colors through its own computer system, as there are some types of these machines run with electronic jacquard devices.

It is worth noting that some types of these machines do not contain a cloth folding device, but rather contain an air suction system for the parts produced, the Vacuum System, which is an external suction unit next to the machine and sucks the final piece to the Big Bell exit unit.

### Research problem

Despite the technological progress in the field of women's clothing production of weft knitwear, most of the local fabrics used in the production of clothing are still produced by traditional methods on circular knitting machines, which are followed by the preparation of the pattern, cutting, detailing .... etc., which costs a lot of time, effort, labor and money. Therefore, it was necessary to study the possibility of producing complete dressing pieces with innovative designs of weft knitting that suit the nature of use and achieve the required quality and functional performance characteristics by controlling the settings of the Seamless Knitting Machines through the machine's design program (Photon), which improves production variables And the design and reduces the number of patterns, cutting and subsequent detailing, which reduces the cost and raises the level of production quality.

### Research Importance

The importance of the research lies in the design and production of new and modified models of non-woven women's clothing with innovative designs to improve their aesthetic and functional properties by controlling the settings of the Seamless Knitting Machine by modifying the machine's computer programming system and its drawing program Photon and the types of materials and structural structures used.

### Research Aims

1. Improving the productivity of Seamless Knitting Machines by controlling the machine settings and modifying the programming system on the machine computer and the drawing

program of the machine Photon, which leads to reducing cost and increasing the profit margin and adding new models with a variety of designs of open buttons that distinguish them from their original traditional products.

2. Achieving the optimum quality and functional performance properties for women's unstitched clothing by controlling the quality of materials and structural compositions used on Seamless Knitting Machines.

3. Develop the local product of unstitched women's clothing to be able to compete in foreign markets.

### Research hypotheses

1- Controlling the settings of the Seamless Knitting Machine by modifying the machine's computer programming system and its Photon drawing program, which allows changing the structural structures to produce modified models with distinctive functional properties of high quality non-woven women's clothing.

2- The difference in the number of the yarns used in production affects the functional properties of the produced non-woven pieces
(Weight - thickness - explosion resistance - air permeability).

### Research Methodology

This research follows the experimental and analytical method.

## Conclusions

1- Nylon and Lycra are among the most appropriate materials that can be used as fabrics for women's underwear (Lingerie) due to their special qualities and features such as comfort when using, fit for body shape and other features.

2- The results showed that the thread number used, the type of material and the shape of the produced design affect the functional properties and the physiological comfort properties of the produced garments.

3- The use of Seamless techniques in the production of a complete piece of clothing on the machine contributes to providing the finishing and processing operations after the product is removed from the machine, thus saving manpower and production processes, and thus improving quality while reducing costs.

## Recommendations

● Attempting to improve the properties of women's clothing fabrics that are currently used by recommending the owners of women's clothing factories to pay attention to scientific methods and research applications for women's clothing fabrics and to benefit from them scientifically.

● Access to clothes that suit women depends on the change in design and the threads of the product to suit its shape and clothing comfort, taking into account the prevailing fashion at a simple cost and high productivity.

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