PROPERTIES OF WOOL YARN & PROPERTIES OF MILIFE FABRICS

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Abstract

In general, properties and characteristics of fabric affect to the selection of each fabric which made from different raw materials. Therefore, fabric properties must be tested to know the advantages and disadvantages. This report demonstrates properties testing of wool yarn and Milife fabric.The objectives of this research were three – fold; to study the procedure of using various instruments; to test and analyze the mechanical properties of wool fibers; and to study on properties of Milife fabric.The measurement of standard properties are including analysis of fibers cross-section area, analysis of fibers diameter from longitudinal, analysis of length, measurement of fineness, measurement of stress-strain, measurement of Uster properties for wool yarn. Moreover, the wicking, thermal shrinkage, thickness and weight, fineness, abrasion were measured for Milife.The study suggested that according to the results of analysis of fiber diameter, white yarns bobbins (W1) have a smaller diameter than white yarns bobbins (W2) and black yarn cops (B) and B are greatest ones. [W1<W2<B]. Furthermore, the results of Milife in the properties tests including wicking, thermal shrinkage, thickness and weight, fineness and abrasion show that Milife fabric may be as thin as tissue paper. Furthermore, it has good heat setting properties and a good ability to absorb.

Keywords: Wool yarn, Properties of yarn, Milife

1.1. Background and importance of the issue

Wool yarn

Natural fibers are greatly elongated substances produced by plants and animals that can be spun into filaments, thread or rope. Woven, knitted, matted or bonded, they form fabrics that are essential to society.

Like agriculture, textiles have been a fundamental part of human life since the dawn of civilization. The oldest wool textile, found in Denmark, dates from 1500 BC, and the oldest wool carpet, from Siberia, from 500 BC. While the methods used to make fabrics have changed greatly since then, their functions have changed very little: today, most natural fibers are still used to make clothing and containers and to insulate, soften and decorate our living spaces. Increasingly, however, traditional textiles are being used for industrial purposes as well as in components of composite materials, in medical implants, and geo- and agro-textiles [1].

Wool has natural crimpiness and scale patterns that make it easy to spin. Fabrics made from wool have greater bulk than other textiles, provide better insulation and are resilient, elastic and durable. Fibre diameter ranges from 16 microns in superfine merino wool (similar to cashmere) to more than 40 microns in coarse hairy wools.

Sheep (*Ovisaries*) were first domesticated 10000 years ago. They currently number about 1 billion head, in 200 breeds, worldwide. Sheep are shorn of their **wool** usually once a year. After scouring to remove grease and dirt, **wool** is carded and combed, then spun into yarn for fabrics or knitted garments. Merino sheep produce up to 18 kg of greasy **wool** a year.

Wool is a multifunctional fibre with a range of diameters that make it suitable for clothing, household fabrics and technical textiles. Its ability to absorb and release moisture makes woollen garments comfortable as well as warm. Two thirds of wool is used in the manufacture of garments, including sweaters, dresses, coats, suits and "active sportswear". Blended with other natural or synthetic fibers, wool adds drape and crease resistance. Slightly less than a third of wool goes into the manufacture of blankets

anti-static and noise-absorbing carpets, and durable upholstery (wool's inherent resistance to flame and heat makes it one of the safest of all household textiles). Industrial uses of wool include sheets of bonded coarse wool used for thermal and acoustic insulation in home construction, as well pads for soaking up oil spills [2].

Milife fabric

Non-woven are flexible, porous, products consisting of one or more fibre layers. The separate fibers may either be preferentially oriented in one direction or may be deposited in a random manner. They are bonded by chemical, thermal or mechanical processes into textile products. Non-woven are mainly planar structures. This relatively young branch of the textile industry has expanded enormously after the second world-war because of the high production rates and the resulting cost savings.

"MILIFE" is totally new nonwoven fabric based on unique and proprietary technology. Milife has unique properties resulting from structure which is composed of MD layer and CD layer. Highly innovative new generation of nonwoven with enhanced structure and sophisticated outlook. Extremely low basis weight is possible with full width (2.2m). By only technology in the world, Milife has new-value beyond the conventional nonwoven. Unique properties have the potential that turns new additional values into reality [3].

1.2 Objectives of the study.

1.2.1 Study the procedure of using various instruments.

1.2.2 Test and analyze the mechanical properties of wool fibers.

1.2.3 Study on properties of Milife fabric.

1.3 Scope of the Study.

1.3.1 Test the properties of wool fibers.

1) Physical properties

- Analysis of fibers cross-section area
- Analysis of fibers diameter from longitudinal
- Analysis of length
- Measurement of fineness

2) Mechanical properties

- Measurement of stress-strain
- Measurement of Uster properties

1.3.2 Test the properties of Milife fabric.

- Wicking
- Thermal Shrinkage
- Thickness and weight
- Fineness
- Abrasion

1.4 The benefits expected from this study

1.4.1 Can use the test machine correctly.

1.4.2 The properties of wool fibers.

1.4.3 Get to know about the properties of Milife fabric.

2.1 Wool Yarn

Wool

While most people picture only sheep when they think of wool, other animals also produce fine protein fibers. Various camels, goats, and rabbits produce hair that is also classified as wool. In scientific terms, wool is considered to be a protein called keratin. Its length usually ranges from 1.5 to 15 inches (3.8 to 38 centimetres) depending on the breed of sheep. Each piece is made up of three essential components: the cuticle, the cortex, and the medulla.

The cuticle is the outer layer. It is a protective layer of scales arranged like shingles or fish scales. When two fibers come in contact with each other, these scales tend to cling and stick to each other. It's this physical clinging and sticking that allows wool fibers to be spun into thread so easily.

The cortex is the inner structure made up of millions of cigar-shaped cortical cells. In natural-colored wool, these cells contain melanin. The arrangement of these cells is also responsible for the natural crimp unique to wool fibers.

Rarely found in fine wools, the medulla comprises a series of cells (similar to honeycombs) that provide air spaces, giving wool its thermal insulation value. Wool, like residential insulation, is effective in reducing heat transfer.

Wool fibers is hydrophilic it has a strong affinity for water and therefore is easily dyed. While it is a good insulator, it scorches and discolours under high temperatures. Each fiber is elastic to an extent, allowing it to be stretched 25 to 30 percent before breaking. Wool does, however, have a tendency to shrink when wet [4].

Tensile strength

Tensile strength is a measurement of the force required to pull something such as rope, wire, or a structural beam to the point where it breaks. The tensile strength of a material is the maximum amount of tensile

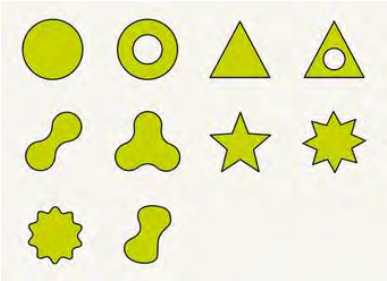
stress that it can take before failure, for example breaking. There are three typical definitions of tensile strength:

- Yield strength - The stress a material can withstand without permanent deformation. This is not a sharply defined point. Yield strength is the stress which will cause a permanent deformation of 0.2% of the original dimension.
- Ultimate strength - The maximum stress a material can withstand.
- Breaking strength - The stress coordinate on the stress-strain curve at the point of rupture [5].

Cross – section

Natural fibers are usually curled, angular, have scales and are crimped; they seldom have a smooth round section. This gives them a typical textile character and feel. Man-made fibers must also exhibit a textile character if they are to be used in the textile field. They are therefore often formed with non-round sections such as indented, star-shaped, triangular, polygonal, etc. (Fig. 16). They can also be made hollow-formed.

The fibre section mainly influences the yarn volume, feel, insulating ability, lustre, and working performance in processing [6].



Dewax.

The invention provides a bleaching method of natural fibers. By the invention, it is possible to bleach raw cotton fibers without dewaxing. The method of the invention is to bring the natural fibers on each of which wax adhere, into contact with water solution containing hydroxypercarboxilic acid for bleaching. The natural fibers may be raw cotton fibers. The hydroxypercarboxilic acid may be per lactic acid. The water solution may contain hydroxycarboxilic acid, hydrogen peroxide and alkali agent with hydroxypercarboxilic acid [7].

2.2 Milife fabric

Non-woven fabric.

Contemporary non-woven fabric dates to the early1930s. At that time, a few textile companies began experimenting with bonded materials as a way of utilizing cotton waste. The first commercial production of the products now called non-woven began in 1942 in the United States in an effort to produce fabric directly from fibers. The market for non-woven products has experienced tremendous growth and has potential for more.

Nonwovens may be classified as either disposable or durable goods. Disposable or non durable, nonwovens include such one-time use products as diapers, medical dressings, household wipes, and disposable protective clothing. Durable goods are used for apparel interfacing, automobile headliners, road underlayment, and carpets [11].

Polyester

Polyester is a term often defined as “long-chain polymers chemically composed of at least 85% by weight of an ester and a dihydric alcohol and a terephthalic acid”. In other words, it means the linking of several esters within the fibers. Reaction of alcohol with carboxylic acid results in the formation of esters.

Polyester also refers to the various polymers in which the backbones are formed by the “ esterification condensation of polyfunctional alcohols and acids”.

Polyester can also be classified as saturated and unsaturated polyesters.

Saturated polyesters refer to that family of polyesters in which the polyester backbones are saturated. They are thus not as reactive as unsaturated polyesters. They consist of low molecular weight liquids used as plasticizers and as reactants in forming urethane polymers, and linear, high molecular weight thermoplastics such as polyethylene terephthalate (Dacron and Mylar) . Usual reactants for the saturated polyesters are a glycol and an acid or anhydride.

Unsaturated polyesters refer to that family of polyesters in which the backbone consists of alkyl thermosetting resins characterized by vinyl unsaturation. They are mostly used in reinforced plastics. These are the most widely used and economical family of resins [12].

Polyester Non-woven Fabric

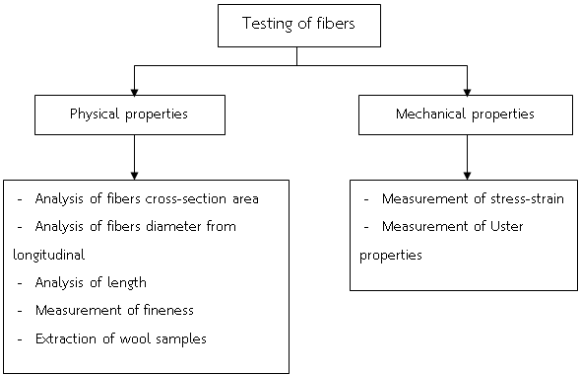
A non-woven fabric composed of 100% polyester filament, features properties of strength and high density. Utilizing these advantages is the ideal material for a wide range of uses, including filter materials in industrial applications. In the civil engineering sector it is used to strengthen embankments. Polyester Non-woven Fabric is also used in agricultural materials, such as anti-weed sheets, in construction materials, including roof linings and house

wraps, and in household products including wrapping bags and packaging

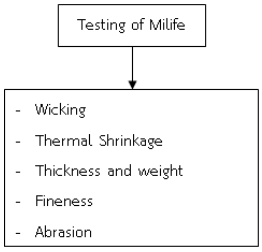
materials. We also manufacture and promote a non-woven fabric composed of PLA resin, environment-friendly plant-derived material [13].

3.1 Method

Wool Yarn



Milife fabric



4.1 Discuss

Wool yarn

The experiment of wool yarn properties test was done by using three types of yarn including white yarns bobbins (W1), white yarns bobbins (W2) and black yarn cops (B). Analysis of fibers cross-section area, analysis of fibers diameter from longitudinal, analysis of length, measurement of fineness were performed to test the physical properties of the fabrics. Additionally, the mechanical properties such as measurement of stress-strain, measurement of Uster properties were done in this study. According to the results analysis of fibers diameter, it was found that W1 has a smaller diameter than W2, B and B has the greatest diameter [W1<W2<B]. Moreover, it was found that the length of W1 is longer than W2 but W2 is shorter than B. Based on the fineness test, W1 is thinner than B and thicker than W2 [B<W1<W2]. In addition, it was shown that W2 has higher hairiness than W1 and B, while W1 has the lowest hairiness from the measurement of Uster properties.

Milife fabric

The properties tests of Milife are wicking, thermal shrinkage, thickness and weight, fineness, abrasion. It was found that Milife fabric may be as thin as tissue paper. Additionally, Milife has good heat setting properties and a good ability to absorb.

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